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2004 Edition

From the Editor

Most of us have heard the phrase "to push the envelope."

It's origins are in the world of aviation and was popularized by Tom Wolfe in 1979 in his book *The Right Stuff*. Test pilots, such as Chuck Yeager and John Glenn were often asked to push a plane past safe performance limits – the envelope. This enabled aeronautical designers to compare calculated performance with actual performance which ultimately lead to safer, more efficient and faster planes.

You may ask why I mention this. Well, to me, the Chuck Yeagers – those with the 'right stuff' – of the technical analysis world are those who 'push the envelope' by considering a 'new' or 'different' way of applying technical analysis techniques. Not all who attempt to push the technical analysis envelope will be successful but every so often someone comes up with a gem. One that comes to mind was the application of statistics to technical analysis which lead to the commonly used Bollinger Bands. The result of successfully pushing the limits is an increase in our technical analysis body of knowledge.

In this *Journal* we feature articles from five IFTA colleagues who have the 'right stuff' - five who submitted original research papers for DITA Level III to complete their Diploma in International Technical Analysis. Mensur Pocinci, Ted Yi-Hua Chen, Ayman Ahmed Waked , Shiro Yamada and Claude Mattern put pen to paper to test their ideas.

The Diploma in International Technical Analysis (DITA) is a three-stage process. Levels I and II must be completed by coursework and examination. Level III must be fulfilled by submission of a research paper that

a) must be original,

b) must deal with at least two different international markets,

c) must develop a reasoned and logical argument and lead to a sound conclusion supported by the tests, studies and analysis contained in the paper,

d) should be of practical application, and

e) should add to the body of knowledge in the discipline of international technical analysis.

Mensur Pocinci's article examines whether momentum strategies can be successfully applied to sector analysis. The strategies were applied in the weekly and monthly time frames and compared to a buy and hold of the benchmark indices. The popularity of Exchange Traded Funds (ETFs) based on financial market sectors makes Mensur's article particularly interesting.

The N-day Diffusion Index and the N-day Diffusion Volatility Index, both market internal indicators, are examined in Ted Chen's article with the aim of deriving meaningful conclusions and practical applications for stock market analysis.

In the next article Ayman Waked examines the accuracy and importance of one of the oldest technical analysis methods, Japanese Candlesticks, in some of the world's oldest markets – the Arab and Mediterranean markets.

In his article, Shiro Yamada shows how to enhance the reliability of signals indicating trend changes by regulating future price ranges based on probability theory.

Claude Mattern's article explores the classification of chart patterns. He proposes an adaptive strategy for traders or advisers called BET (Build-Up, Exit, Target) when assessing patterns.

The final article is not a DITA III research paper but a collaborative effort by Professor Henry Pruden, Visiting Professor/Visiting Scholar, and Professor Benard Belletante, Dean and Professor of Finance, EuroMed-Marseille Ecole de Management, Marseille, France. They examine the methods of Richard D Wyckoff, an innovator in his time and a man who had great market insight. In this article they subject the Wyckoff Method to a 'real-time-test under the natural laboratory conditions of the current U.S. stock market.'

I thank the authors for their contribution. I'm sure that readers of this journal will find interest in all of the articles. I'm also sure that the articles will inspire IFTA colleagues to 'push the envelope' and to put their ideas into action by submitting them as a DITA III research paper.

There are three persons, other than the authors who should be acknowledged for their efforts in producing the *IFTA Journal*. The first is Barbara Gomperts of Financial & Investment Graphic Design in Boston, MA, USA. Ms Gomperts, for quite a few years now, has been responsible for putting the polish on the *IFTA Journal*. Once again she has done a magnificent job, sometimes under trying circumstances, and has always acted in a thoroughly professional and friendly manner.

The second and third persons to be acknowledged are my fellow IFTA Board members and *Journal* Committee members John Schofield (TASHK) and Larry Berman (CSTA). They spent many hours assessing the suitability of articles for publication and proofreading. Their sharp eyes and ability to work as part of a team made the task of publishing this *Journal* a pleasure. I am grateful for their contribution.

Once again this *Journal* may truly be called international as it is the result of a collaboration of IFTA colleagues in many, varied geographical locations – Europe, the Middle East, South East Asia, North America and Australia.

Larry V Lovrencic, DipTA (ATAA)
Editor

Momentum Strategies Applied To Sector Indices

Mensur Pocinci

INTRODUCTION

Working as a Technical Analyst for a one of the biggest banks in the world implies having customers from different backgrounds and preferences. An increasing number of clients, internal and external, are now looking for sector information. If one client doesn't like, say the Italian Telecoms in the European Telecom sector, they could be looking for other stocks in the same sector if they knew that the Telecom sector was rated bullish. Sector analysis can thus offer clients more choice in building their portfolios. Sector investing has also become popular in Europe thanks to the introduction of the Euro. Portfolio management and funds management have changed dramatically in the past few years in Europe. Before European monetary union, analysts, portfolio managers and fund mangers focused, mostly, on local markets. Recently a large U.S. broker concluded from a survey that up to 90% of European portfolio and fund managers used a sector approach instead of a country approach to allocate their moneys.

I decided to set myself a task for my Diploma in International Technical Analysis (DITA III) research paper to find out if price-momentum strategies work in the short- and medium-term time frame on sectors. Price momentum strategies are simple strategies and most people should intuitively understand the logic behind buying past winners and selling past losers.

Thanks to this shift in investment approach, several exchanges have introduced ETFs (Exchange Traded Funds) based on S&P Sectors or DJ Euro Stoxx Sectors.

In this article I will initially examine the weekly and monthly strategy on the Stoxx sectors and then continue within the appropriate time frame on the S&P 500 groups. Finally, I will build a portfolio that is either long the Stoxx or S&P 500 strategy to examine if additional value or a decrease in risk can be achieved.

I will attempt to answer the following questions:

- Which time frame to use?
- What portfolio size?
- What is the risk of the strategy?

PREVIOUS RESEARCH ON PRICE MOMENTUM STRATEGIES

Price momentum has been tested extensively on individual stocks. For example, DeBondt and Thaler (1985,1987) reported that long-term past losers outperform long-term past winners over the subsequent three to five years. Jagadeesh (1990) and Lehmann (1990) found short-term return reversals. Jagadeesh and Titman added a new twist to this literature by documenting that over an intermediate horizon of three to twelve months, past winners on average continued to outperform past losers.

INVESTMENT UNIVERSE

This analysis uses the 18 DJ Euro Market Sectors (Table1.1) in Euro and US$ and the S&P 500 groups (Table1.2). I have chosen those as they are generally accepted as the benchmark in investments in those sectors and are most widely followed by investors around the globe.

The historical prices of the DJ Market Sectors and the S&P500 were obtained from DataStream. The prices in US$ for the DJ Market Sectors were calculated and offered by DataStream.

Table 1.1 – DJ Sectors

DJ Euro Stoxx Auto	DJ Euro Stoxx Bank
DJ Euro Stoxx Basic Matirial	DJ Euro Stoxx Consumer Cyclical
DJ Euro Stoxx Chemical	DJ Euro Stoxx Consumer Non Cyclical
DJ Euro Stoxx Construction	DJ Euro Stoxx Energy
DJ Euro Stoxx Food & Beverage	DJ Euro Stoxx Financial Services
DJ Euro Stoxx Healthcare	DJ Euro Stoxx Industrial
DJ Euro Stoxx Insurance	DJ Euro Stoxx Media
DJ Euro Stoxx Retail	DJ Euro Stoxx Telecom
DJ Euro Stoxx Technology	DJ Euro Stoxx Utilities Supplier

Table 1.2 – S&P 500 Groups

S&P 500 Agricultural Products	S&P 500 Air Freight
S&P 500 Airlines	S&P 500 Aluminum
S&P 500 Auto Parts & Equipment	S&P 500 Automobiles
S&P 500 Banks (Major Regional)	S&P 500 Banks (Money Center)
S&P 500 Basic Materials	S&P 500 Beverage (Alcoholic)
S&P 500 Beverages (Non Alcoholic)	S&P 500 Biotechnology
S&P 500 Building Materials	S&P 500 Capital Goods
S&P 500 Chemicals	S&P 500 Chemicals (Diversified)
S&P 500 Chemicals (Speciality	S&P 500 Comm. Equipment
S&P 500 Comm. Services	S&P 500 Computers (Hardware)
S&P 500 Computers (Network)	S&P 500 Computers (Peripherals)
S&P 500 Computers Software/Service	S&P 500 Construction
S&P 500 Consumer Finance	S&P 500 Consumer Jewel. & Gifts
S&P 500 Consumer Staples	S&P 500 Container & Packaging (Paper)
S&P 500 Containers (Metal & Glass)	S&P 500 Distributors (Food & Health)
S&P 500 Electric Companies	S&P 500 Electrical Companies
S&P 500 Electronics (Defense)	S&P 500 Electronics (Instrumental)
S&P 500 Electronics (Semiconductors)	S&P 500 Electronics Compontent Dstr.
S&P 500 Engineering & Construction	S&P 500 Entertainment
S&P 500 Equipment (Semiconductor)	S&P 500 Financial (Diversified)
S&P 500 Financials	S&P 500 Foods
S&P 500 Footwear	S&P 500 Gaming Lotterey / Para.cos
S&P 500 Gold & Prec. Metals Mining	S&P 500 Hardware & Tools
S&P 500 Health Care (Diversified)	S&P 500 Health Care (Hospital Mgmt)
S&P 500 Health Care (Long Term Care)	S&P 500 Health Care (Managed Care)
S&P 500 Health Care (Spec. Services)	S&P 500 Health Care (Drugs & Other)
S&P 500 Health Care Drugs Mjr Pharma	S&P 500 Health Care Medical Products
S&P 500 Homebuilder	S&P 500 Household Furn & Appliance
S&P 500 Household Products	S&P 500 Housewares
S&P 500 Insurance (Life/Health)	S&P 500 Insurance (Multi-line)
S&P 500 Insurance Brokers	S&P 500 Insurance Property/Casual
S&P 500 Investment Banking/Broking	S&P 500 Investment Management
S&P 500 Iron & Steel	S&P 500 Leisure Time Products
S&P 500 Lodging Hotels	S&P 500 Machinery (Diversified)
S&P 500 Manufact. (Diversified)	S&P 500 Manufact. (Specialised)
S&P 500 Metals (Mining)	S&P 500 Natural Gas
S&P 500 Office Equip & Supplies	S&P 500 Oil & Gas (Expl/Prodn)
S&P 500 Oil & Gas (Refining/Mktg)	S&P 500 Oil & Gas Drilling Equip
S&P 500 Oil (Intl. Intergrated)	S&P 500 Oil (Domestic Intergrated)
S&P 500 Paper & Forest Products	S&P 500 Personal Care
S&P 500 Photography Imaging	S&P 500 Power Producers
S&P 500 Publishing	S&P 500 Publishing (Newspaper)
S&P 500 Railroads	S&P 500 Restaurants
S&P 500 Retail (Building Supp)	S&P 500 Retail (Cpu/Electro)
S&P 500 Retail (Dept. Stores)	S&P 500 Retail (Discounters)
S&P 500 Retail (Drug Stores)	S&P 500 Retail (Food Chains)
S&P 500 Retail (General Merch.)	S&P 500 Retail (Spec. Apparel)
S&P 500 Retail (Specialty)	S&P 500 Savings & Loan Companies
S&P 500 Services (Adv. Marketing)	S&P 500 Services Comercial / Consm
S&P 500 Services Computer Systems	S&P 500 Services Data Processing
S&P 500 Services Facilities /Entv	S&P 500 Specialty Printing
S&P 500 Telecom. (Cell/Wireless)	S&P 500 Telecom. (Long Distance)
S&P 500 Telephone	S&P 500 Textiles (Apparel)
S&P 500 Textiles (Home Furns.)	S&P 500 Tobacco
S&P 500 Transportation	S&P 500 Truckers
S&P 500 Trucks & Parts	S&P 500 Utilities
S&P 500 Waste Management	

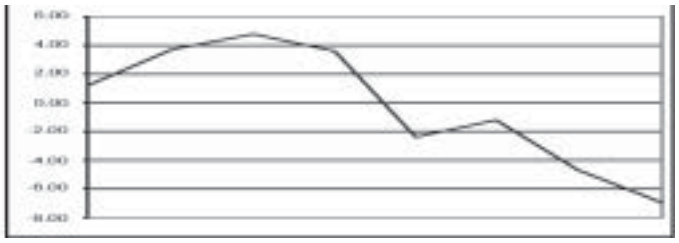
ROC (RATE OF CHANGE)

At the end of each period the different ROCs (see table 2 and graph 3 for calculation) were calculated for both weekly and monthly returns. The weekly returns were calculated on closing price of Friday or if Friday was a holiday the day before it. The same for the monthly ROCs, which were calculated on the last trading day of the ending month.

Table 2 - Relative Strength

DATE	Price(A)	Price 10 Days ago (B)	ROC (A/B)*100
JAN 1st	80		
2nd	81		
3	83		
4	86		
5	87		
8	85		
9	86		
10	87		
11	91		
12	79		
15	81	80	1.25
16	84	81	3.70
17	87	83	4.82
18	88	85	3.53
19	85	87	-2.30
22	84	85	-1.18
23	82	86	-4.65
24	81	87	-6.90

Graph 3



Mathematically, the Relative Strength indicator is simply the ratio of one data series divided by another. Generally, a stock price or industry group index is divided by a broad general market index to demonstrate the trend of performance of the stock relative of the market as a whole.

Ranking

The sectors were ranked by their ROC at the end of their time frame.

Performance Measurement

The different sectors were equally weighted in the performance measurement. That is, an average performance was calculated. For example, if a top 3 portfolio had one sector up 3%, one flat and the last up 1% the performance for that time period the average performance for the portfolio would be 1.3%. The buying and selling took place on the last day of calculations on the closing price. If a sector were to fall out of the portfolio, it would fall out on Fridays close and the new one added with the closing price of the same Friday.

Portfolio Construction

The portfolio was constructed by buying the x-top ranked sector (portfolio size) and selling those that fell below the portfolio size. For example in the monthly screen with a 3-month ROC on a 3-sector portfolio the top 3 ranked sectors by their 3 monthly ROC were bought and the previously held sector, if no longer among the top 3 ranked, were sold.

Portfolio Change

The construction of the portfolio only changed if the rankings changed. For example, if, say, the DJ Euro Telecom sector fell from 1st place in the 3-month ROC ranking to 5th place it would be replaced by the top ranked sector in a 1-sector portfolio.

Risk / Reward

It is important to not only calculate and compare total return data but also put them into perspective with the risk generated by those strategies. Risk was measured by drawdown (graph 5 table 4). The Risk / Reward was calculated by dividing total return with the maximal drawdown to see how much return one percent drawdown generates. Perry Kaufman wrote in his book, Trading System and Methods, "Downside equity movements are often more important than profit patterns. It is clear that if you have to evaluate and test new strategies and ideas you should know the price of risk that you pay". That's why I also analysed risk / reward to find the best solution.

Graph 5

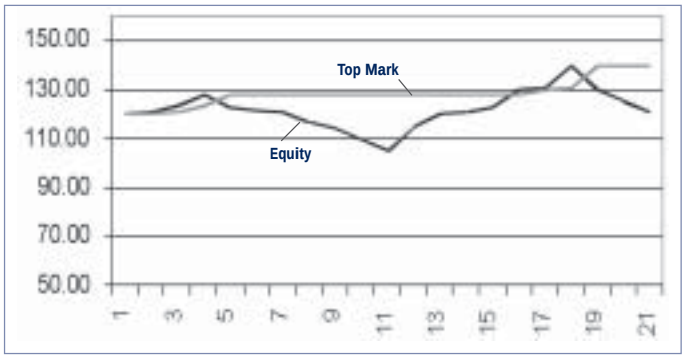


Table 4

EQUITY B	TOP MARK C		% DRAWDOWN	
120.00	120.00	*B2*	0.00	*(B2-C2)*100/C2*
121.00	120.00	*MAX(B2;C2)*	0.83	
124.00	121.00		2.48	
128.00	124.00		3.23	
123.00	128.00		-3.91	
122.00	128.00		-4.69	
121.00	128.00		-5.47	
117.00	128.00		-8.59	
114.00	128.00		-10.94	
110.00	128.00		-14.06	
105.00	128.00		-17.97	
115.00	128.00		-10.16	
120.00	128.00		-6.25	
121.00	128.00		-5.47	
123.00	128.00		-3.91	
130.00	128.00		1.56	
131.00	130.00		0.77	
140.00	131.00		6.87	
130.00	140.00		-7.14	
125.00	140.00		-10.71	
121.00	140.00		-13.57	

SUMMARY STATISTICS

- **Average Return:** The average returns in the tables for the rolling periods were calculated as geometric returns.
- **Average Weekly / Monthly Trades:** This represents the average weekly/monthly trades for the tested strategy.
- **Maximal Drawdown:** Calculates the maximal loss from the highest level in performance / equity.
- **Maximal Drawdown / Total Return:** Calculates how much return is generated by one percent drawdown.
- **% Outperforming x W/M:** This figure shows the percentage of periods where the strategy outperformed the Buy and Hold strategy for the S&P 500 index or DJ Stoxx index.

Number of Sectors Held

S&P 500	EuroStoxx
5	1
10	2
20	3
30	6

Portfolio Return Data

The return data for the different portfolios was calculated without any use of commission.

Average past performances were used, not only on different time frames, but also on the success rate in outperforming the benchmark in time.

Maximum Drawdown

As written in the introduction I examined maximum drawdown. Maximum drawdown is the percentage drop in performance or equity curve from the previous highest value (see table 4 and graph 5 for calculations). I used the maximum Drawdown to calculate the Risk/Return values.

Results DJ Europe Sectors Weekly

The weekly portfolios were calculated on the following different parameters:

ROC:

- 1-week % price change
- 5-week % price change
- 13-week % price change
- 21-week % price change
- 34-week % price change

Portfolio size:

- 1-Sector
- 2-Sectors
- 3-Sectors
- 6-Sectors

The data used was from 01.09.1987 - 31.08.2001 and was obtained from DataStream.

1-SECTOR

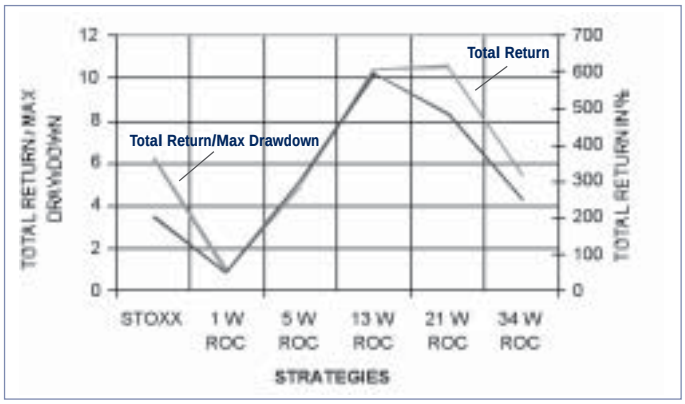
Starting at the max draw down (Table 2.1) all strategies show higher maximum drawdown than the DJ Stoxx index, with the 1-week ROC leading with 63%, which is almost double the Stoxx with 33%. This risk is justified, as seen in Table (2.1), only in the 13 w roc and 21 w roc strategies as only those manage to beat the Stoxx in draw down / total return. The evidence on the 1-Sector portfolio doesn't leave any room for doubts as 13 week Roc convinces with highest return and highest maximal drawdown/total return ratio. The %outperfoming periods are also encouraging with the highest % outperforming of the buy & hold in 83% of the time. As seen on graph (5.1) both total return and drawdown/total return ratio peak at the 13-week Roc. The only negative is the high trading frequency with 0.7 trades a week.

DJ Stoxx Weekly 1-Sector - Table 2.1

AVG % RETURN	STOXX	1 W ROC	5 W ROC	13 W ROC	21 W ROC	34 W ROC
1W	0.15	0.06	0.19	0.26	0.24	0.17
3W	0.47	0.20	0.59	0.81	0.73	0.52
6W	0.96	0.45	1.20	1.64	1.47	1.07
12W	2.19	1.31	2.79	3.59	3.22	2.53
24W	5.08	3.47	6.42	8.25	7.12	5.84
36W	8.07	5.79	10.47	13.26	11.26	9.18
		1 W ROC	5 W ROC	13 W ROC	21 W ROC	34 W ROC
%OUTP 1W		64	67	66	67	67
%OUTP 3W		60	66	68	67	65
%OUTP 6W		61	67	71	67	67
%OUTP 12W		74	78	81	78	78
%OUTP 24W		78	81	85	79	83
%OUTP 36W		65	74	83	70	75
		1W ROC	5W ROC	13W ROC	21W ROC	34W ROC
# AVG TRADES PER WEEK		1.88	1.11	0.69	0.51	0.45
# TRADES TOTAL		1375	811	507	377	333
	STOXX	1W ROC	5W ROC	13W ROC	21W ROC	34W ROC
MAX DRAWDOWN	-33	-63	-61	-57	-46	-46
	STOXX	1W ROC	5W ROC	13W ROC	21W ROC	34W ROC
TOTAL RETURN	205	54	307	596	486	250
RETURN / DD	6.27	0.86	4.99	10.40	10.53	5.42

Graph 5.1 - Total Return & Return/Max Drawdown

2-SECTORS



Starting at the max draw down (Table 2.1) all strategies show higher maximum drawdown than the DJ Stoxx index, with the 1-week ROC leading with 63%, which is almost double the Stoxx with 33%. This risk is justified, as seen in Table (2.1), only in the 13-week ROC and 21 w roc strategies as only those manage to beat the Stoxx in drawdown/total return. The evidence on the 1-sector portfolio doesn't leave any room for doubts as 13-week ROC convinces with highest return and highest maximal drawdown/total return ratio. The % outperfoming periods are also encouraging with the highest % outperforming of the buy & hold in 83% of the time. As seen on graph (5.1) both total return and drawdown/total return ratio peak at the 13-week ROC. The only negative is the high trading frequency with 0.7 trades a week.

DJ Stoxx Weekly 2-Sectors - Table 2.2

AVG % RETURN	STOXX	1 W ROC	5 W ROC	13 W ROC	21 W ROC	34 W ROC

1W	0.15	0.13	0.27	0.30	0.23	0.18
3W	0.47	0.41	0.85	0.92	0.68	0.55
6W	0.96	0.86	1.73	1.87	1.37	1.12
12W	2.19	0.20	3.82	4.06	3.07	2.58
24W	5.08	4.65	8.43	8.92	6.86	5.89
36W	8.07	7.30	13.37	14.03	10.87	9.49
		1 W ROC	5 W ROC	13 W ROC	21 W ROC	34 W ROC
%OUTP 1W		64	65	68	66	65
%OUTP 3W		65	69	69	67	65
%OUTP 6W		65	74	71	67	66
%OUTP 12W		79	85	87	81	75
%OUTP 24W		80	87	91	81	80
%OUTP 36W		66	91	93	76	69
		1 W ROC	5 W ROC	13 W ROC	21 W ROC	34 W ROC
# AVG TRADES PER WEEK		3.51	1.74	1.07	0.90	0.73
# TRADES TOTAL		2570	1276	786	662	538
	STOXX	1 W ROC	5 W ROC	13 W ROC	21 W ROC	34 W ROC
MAX DRAWDOWN	-33	-43	-46	-36	-34	-45
	STOXX	1 W ROC	5 W ROC	13 W ROC	21 W ROC	34 W ROC
TOTAL RETURN	205	159	649	811	420	274
RETURN / DD	6.27	3.71	14.13	22.31	12.52	6.09

3-SECTORS

The trend of lower drawdowns and higher outperforming percentages continues on the 3-Sector portfolio. Total return and risk-adjusted returns increase except for the 13-w-ROC when compared to the 2-Sector strategy. The 1-w-ROC still doesn't manage to outperform buy & hold (see table 2.3). Trades continue to rise to 1.34 per week for the best risk adjusted performance still being held by the 13-w-ROC.

DJ Stoxx Weekly 3 Sectors - Table 2.3

AVERAGE % RETURN	STOXX	1 W ROC	5 W ROC	13 W ROC	21 W ROC	34 W ROC
1W	0.15	0.13	0.28	0.29	0.24	0.20
3W	0.47	0.43	0.88	0.90	0.74	0.61
6W	0.96	0.89	1.80	1.18	1.49	1.12
12W	2.19	2.08	3.97	3.98	3.29	2.79
24W	5.08	4.80	8.73	8.75	7.18	6.30
36W	8.07	7.56	13.90	13.78	11.31	10.89
		1 W ROC	5 W ROC	13 W ROC	21 W ROC	34 W ROC
%OUTP 1W		66	66	66	68	66
%OUTP 3W		63	70	70	67	66
%OUTP 6W		65	75	71	69	66
%OUTP 12W		81	85	89	86	77
%OUTP 24W		82	87	91	85	83
%OUTP 36W		71	93	96	84	74
		1 W ROC	5 W ROC	13 W ROC	21 W ROC	34 W ROC
# AVG TRADES PER WEEK		4.90	2.28	1.34	1.21	0.93
# TRADES TOTAL		3591	1669	983	885	683
	STOXX	1 W ROC	5 W ROC	13 W ROC	21 W ROC	34 W ROC
MAX DRAWDOWN	-33	-38	-41	-35	-37	-43
	STOXX	1 W ROC	5 W ROC	13 W ROC	21 W ROC	34 W ROC
TOTAL RETURN	205	171	705	738	491	333
RETURN / DD	6.27	4.54	17.13	21.26	13.31	7.78

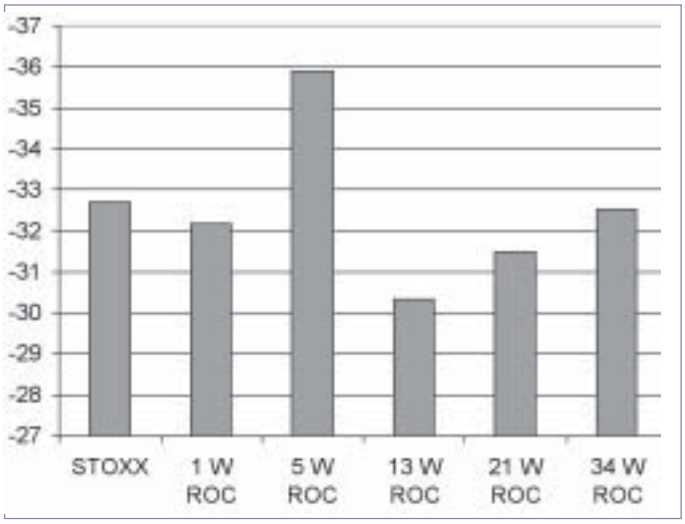
6-SECTORS

The trend of lower max drawdown continues in the 6-sectors portfolio as well and more important now 3 strategies (see graph 3.4 and table 2.4) have lower drawdowns than the Stoxx index. The total return figures decline compared to the 3-sectors portfolio in all strategies expect the 1-w-ROC and 34-w-ROC, which see slight improvement. The risk-adjusted returns (total return / drawdown) are lower than in the 3-sector portfolio in the 5 and 13-w-ROC.

DJ Stoxx Weekly 6 Sectors - Table 2.4

AVERAGE % RETURN	STOXX	1 W ROC	5 W ROC	13 W ROC	21 W ROC	34 W ROC
1W	0.15	0.14	0.24	0.26	0.22	0.20
3W	0.47	4.72	0.76	0.80	0.70	0.62
6W	0.96	0.96	1.55	1.63	1.42	1.27
12W	2.19	2.23	3.43	3.59	3.16	2.85
24W	5.08	5.06	7.56	7.86	6.95	6.32
36W	8.07	7.94	11.92	12.32	10.89	9.92
		1 W ROC	5 W ROC	13 W ROC	21 W ROC	34 W ROC
%OUTP 1W		66	67	67	66	65
%OUTP 3W		64	70	71	68	68
%OUTP 6W		66	74	75	72	70
%OUTP 12W		82	87	89	87	82
%OUTP 24W		83	89	91	90	85
%OUTP 36W		71	95	100	87	78
		1 W ROC	5 W ROC	13 W ROC	21 W ROC	34 W ROC
# AVG TRADES PER WEEK		7.87	3.42	1.94	1.59	1.26
# TRADES TOTAL		5772	2508	1423	1162	924
	STOXX	1 W ROC	5 W ROC	13 W ROC	21 W ROC	34 W ROC
MAX DRAWDOWN	-33	-32	-36	-30	-31	-33
	STOXX	1 W ROC	5 W ROC	13 W ROC	21 W ROC	34 W ROC
TOTAL RETURN	205	199	500	570	431	347
RETURN / DD	6.27	6.20	13.93	18.80	13.68	10.66

Graph 3.4



Results DJ Europe Sectors Monthly

The monthly portfolios were calculated on the following different

parameters:
ROC:

- 1-month % price change
- 2-months % price change
- 3-months % price change
- 6-months % price change
- 9-months % price change
- 12-months % price change

Portfolio size:

- 1-Sector
- 2-Sectors
- 3-Sectors
- 6-Sectors

The data used was from 30.09.1987 - 31.08.2001 and has been obtained from DataStream.

1-SECTOR

The main difference to the weekly strategy here is the low turn over. The highest average monthly trade is 1.79 and the bottom at 0.65 trades per month. All look-back periods outperform the STOXX index in total return and risk adjusted return (see table 2.5) except for the 6-m ROC, which has lower returns as well as the second highest max drawdown. The only strategy having lower max drawdown than the Stoxx index was the 3-m ROC with -30%, which puts it second in risk adjusted returns after the 12-ROC. On the total return the 1 m ROC is second with 1045% but drops to third place in risk adjusted return as it has the highest drawdown with 55%. The pattern of turnover decreasing with increasing look back period continues and the highest risk-adjusted and total return strategy has the lowest turnover with only 0.65 trades a month.

DJ Stoxx 1-Sector Monthly - Table 2.5

AVG. % RETURN	STOXX	1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
1M	0.71	16.89	13.93	15.10	8.21	11.38	15.08
3M	2.42	54.96	45.47	46.87	25.58	36.60	47.51
6M	5.59	118.86	98.16	97.78	52.80	78.02	98.04
12M	12.68	268.31	224.66	209.63	107.53	167.45	210.10
24M	28.12	647.82	488.83	454.96	210.27	372.45	503.40
36M	42.65	1081.75	734.78	715.54	288.67	598.33	853.79
		1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
%OUTP 1M		52	54	53	49	52	55
%OUTP 3M		61	55	56	47	56	55
%OUTP 6M		66	58	59	48	54	56
%OUTP 12M		79	65	69	44	63	63
%OUTP 24M		89	70	76	35	67	68
%OUTP 36M		94	76	84	27	70	72
		1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
# AVG TRADES PER MONTH		1.80	1.46	1.20	0.99	0.85	0.65
# TRADES TOTAL		302	245	201	167	143	108
	STOXX	1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
MAX DRAWDOWN	-32	-55	-42	-30	-43	-38	-35
	STOXX	1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
TOTAL RETURN	223	1045	605	773	166	352	1078
RETURN / DD	6.78	18.89	14.33	25.70	3.89	9.37	30.71

2-SECTORS

The returns on the 2-sectors strategy were about 30-40% lower than for the 1-sector strategy and the total return / drawdown ratio worsened. The highest total return was achieved in the 1-month strategy whereas the 3-month strategy received the highest risk return data.

DJ Stoxx 2-Sector Monthly - Table 2.6

AVG. % RETURN	STOXX	1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
1M	0.71	16.89	13.93	15.10	8.21	11.38	15.08
3M	2.42	54.96	45.47	46.87	25.58	36.60	47.51
6M	5.59	118.86	98.16	97.78	52.80	78.02	98.04
12M	12.68	268.31	224.66	209.63	107.53	167.45	210.10
24M	28.12	647.82	488.83	454.96	210.27	372.45	503.40
36M	42.65	1081.75	734.78	715.54	288.67	598.33	853.79
		1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
%OUTP 1M		56	54	53	49	52	55
%OUTP 3M		53	55	56	54	56	55
%OUTP 6M		62	58	59	56	54	56
%OUTP 12M		84	65	69	59	63	63
%OUTP 24M		97	70	76	60	67	68
%OUTP 36M		97	76	84	65	70	72
		1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
# AVG TRADES PER MONTH		3.90	3.70	3.50	2.75	2.10	1.90
# TRADES TOTAL		647	614	581	456	348	315
	STOXX	1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
MAX DRAWDOWN	-32	-55	-42	-30	-43	-38	-35
AVG. % RETURN	STOXX	1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
TOTAL RETURN	223	1045	605	773	166	352	1078
RETURN / DD	6.78	18.89	14.33	25.70	3.89	9.37	30.71

3-SECTORS

The average monthly trades continued to rise. Return and risk return only improved in the 3-month and 6-month look-back periods. Compared to the 1-sector portfolio, only the 6-m-ROC has a higher total return risk adjusted return.

DJ Stoxx 3-Sectors Monthly - Table 2.7

AVG. % RETURN	STOXX	1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
1M	0.71	13.99	12.84	13.85	12.11	10.87	11.92
3M	2.42	45.43	40.67	43.48	37.37	35.63	38.58
6M	5.59	97.71	87.15	91.11	78.34	75.33	80.56
12M	12.68	217.16	195.05	195.70	167.62	160.25	172.81
24M	28.12	506.05	427.63	425.63	365.90	359.76	409.99
36M	42.65	804.66	651.67	666.02	567.20	576.96	675.86
		1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
%OUTP 1M		52	51	54	51	53	54
%OUTP 3M		55	57	55	53	53	52
%OUTP 6M		58	57	59	54	56	57
%OUTP 12M		82	65	67	62	60	58
%OUTP 24M		97	74	79	64	68	63
%OUTP 36M		96	77	83	77	76	66
		1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
# AVG TRADES PER MONTH		6.20	5.90	5.41	4.34	3.63	2.51
# TRADES TOTAL		647	605	457	367	307	208
	STOXX	1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
MAX DRAWDOWN	-32	-45	-38	-29	-34	-48	-51

	STOXX	1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
TOTAL RETURN	223	587	440	591	385	302	640
RETURN / DD	6.78	13.01	11.60	20.19	11.35	6.27	12.45

6-SECTORS

The total returns continued to fall on look-back periods but the risk returns improved slightly in all of the look-back periods as the drawdowns came down. Once again the 6-m-ROC was the only strategy to perform better in the 6-sector portfolio than in the 1-sector portfolio.

DJ Stoxx 6-Sectors Monthly - Table 2.8

AVG. % RETURN	STOXX	1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
1M	0.71	13.05	12.31	13.18	11.80	10.42	10.63
3M	2.42	41.42	39.06	41.00	36.73	33.07	34.29
6M	5.59	87.55	83.14	85.34	77.06	69.01	71.46
12M	12.68	189.54	182.56	180.86	164.28	145.81	151.96
24M	28.12	422.03	401.29	389.35	358.72	317.08	341.43
36M	42.65	671.16	636.92	611.81	568.12	506.01	549.14
		1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
%OUTP 1M		51	51	50	52	56	53
%OUTP 3M		53	53	55	54	53	52
%OUTP 6M		60	59	58	58	57	55
%OUTP 12M		85	70	68	65	54	55
%OUTP 24M		99	85	74	71	60	51
%OUTP 36M		85	92	79	79	67	52
		1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
# AVG TRADES PER MONTH		10.15	7.91	5.61	4.90	4.05	
# TRADES TOTAL			858	668	474	414	336
	STOXX	1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
MAX DRAWDOWN	-32	-31	-34	-23	-27	-34	39
	STOXX	1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
TOTAL RETURN	223	499	412	485	358	274	503
RETURN / DD	6.78	16.08	12.19	21.37	13.48	8.03	12.85

S&P 500 MONTHLY RESULTS

As we have seen there was no additional value in using the weekly system showing lower returns and higher drawdowns. I decided to only analyse the monthly system for the S&P 500 groups. The tests on the S&P 500 groups were the same as on the DJ Stoxx with the only difference being that the available data went back to 01.08.1982. Thus, I tested from 01.08.1982 to 31.08.2001, which represented a 19-year period.

The monthly portfolios were calculated on the following different parameters:

ROC:

- 1-month % price change
- 2-months % price change
- 3-months % price change
- 6-months % price change
- 9-months % price change
- 12-months % price change

Portfolio size:

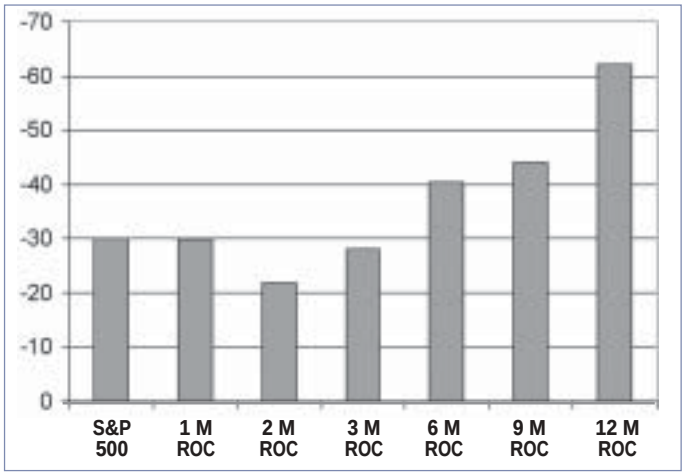
- 5-Sectors
- 10-Sectors
- 20-Sectors
- 30-Sectors

5. SECTORS

The 5-sector strategy shows that all look-back periods manage to outpace the S&P 500 index buy & hold in total return. For the risk adjusted return the 12-m-ROC beat the S&P 500 index. Looking at the max drawdown, the longer look-back periods from 6-m-ROC on only produced higher drawdowns than the S&P 500. The risk adjusted return topped at the 2-m-ROC with a figure of 82.55 Return / Drawdown and continued to decline in the following periods.

Graph 3.9 - Max Drawdown

10-SECTORS



Also, here, all look-back periods managed to achieve higher total returns than the S&P 500 index and on a risk-adjusted basis only the 9-m-ROC outpaced the S&P 500 index. The drawdowns up to the 3-m-ROC remained the same as the 5-sector portfolio but had higher drawdowns for the 9-m-ROC and lower ones for the 12-m-ROC. The total return peaked at the 12-m-ROC but because of the high drawdown, the risk-adjusted return was lead by the 2-m-ROC with 78.30. The other difference to the 5-sector portfolio was the increased number of trades, about 50-100% higher.

S&P 500 Monthly 10-Groups - Table 2.10

AVG. % RETURN	S&P 500	1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
1M	0.99	1.82	1.46	1.38	1.26	1.14	1.33
3M	3.19	3.25	4.36	4.19	3.72	3.38	3.97
6M	6.71	6.74	9.04	8.60	7.59	7.05	8.34
12M	14.31	13.33	18.61	17.78	15.34	14.59	17.40
24M	30.43	27.76	41.33	38.75	31.30	31.54	38.49
36M	49.6	44.91	70.12	63.87	48.11	50.03	62.87
		1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
%OUTP 1M		53	50	50	54	53	52
%OUTP 3M		50	52	54	52	53	54
%OUTP 6M		48	54	54	51	52	54
%OUTP 12M		47	62	55	52	51	58
%OUTP 24M		49	76	68	60	51	64
%OUTP 36M		48	79	69	56	58	68
		1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
# AVG TRADES PER MONTH		13.30	11.35	9.89	7.44	6.13	5.08
# TRADES TOTAL		3058	2611	2275	1711	1411	1169
	S&P 500	1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
MAX DRAWDOWN	-30.17	-29.93	-21.99	-28.06	-40.27	-52.94	-49.68
	S&P 500	1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
TOTAL RETURN	847	1298	1722	2006	2035	1291	2237
RETURN / DD	28.08	43.39	78.30	71.50	50.54	24.40	45.04

20-SECTORS

The major difference to the 5-sector strategy was the increased average trades per month with an average of 3-4 fold. The major improvement was on the drawdown side with the 1-m-ROC now half the buy & hold drawdown and the 2-m-ROC and 3-m-ROC with lower drawdowns than the S&P 500. The highest total return was achieved by the 1-m-ROC as well as the risk-adjusted return - both continued to decline until the 6-m-ROC before climbing again. The 1-m-ROC had the highest risk-adjusted return so far but when compared to the 5-sector strategy it made 4 times more trades a month and generated 3 times more risk-adjusted return.

S&P 500 Monthly 20-Groups - Table 2.11

AVG. % RETURN	S&P 500	1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
1M	0.99	1.33	1.36	1.10	0.97	1.11	1.27
3M	3.19	3.93	4.01	3.25	2.83	3.32	3.79
6M	6.71	8.19	8.27	6.75	5.83	6.90	7.93
12M	14.31	17.12	16.98	13.60	11.56	14.30	16.81
24M	30.43	38.33	37.43	28.29	22.60	30.55	37.35
36M	49.60	65.04	62.46	45.35	33.56	48.10	60.29
		1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
%OUTP 1M		52	53	52	51	53	52
%OUTP 3M		69	71	68	64	68	64
%OUTP 6M		52	52	49	47	52	53
%OUTP 12M		57	56	53	42	54	60
%OUTP 24M		69	73	45	40	59	63
%OUTP 36M		73	76	41	37	56	67
		1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
# AVG TRADES PER MONTH		29.07	20.40	21.24	12.27	10.05	8.65
# TRADES TOTAL		6685	4691	4886	2822	2312	1990
	S&P 500	1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
MAX DRAWDOWN	-30.17	-14.73	-20.19	-26.88	-33.56	-38.63	30.08
	S&P 500	1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
TOTAL RETURN	847	2051	1807	929	553	1050	1677
RETURN / DD	28.08	139.27	89.51	34.56	16.48	27.18	55.75

30-SECTORS

The 30-sector portfolio had higher drawdowns for the 6-m-ROC to 12-m-ROC. The total return peaked at 1-m-ROC and continued to decline until the 6-m-ROC where it turned upward again. The highest risk-adjusted return was also achieved by the 1-m-ROC; only the 6-m-ROC and 9-m-ROC had a lower risk-adjusted return than the S&P 500 index. The biggest disadvantage was the high trading turnover. Compared to the 5-sectors 1-m-ROC, the 30-sectors 1-m-ROC had more than 5 times the trading turnover and a risk-adjusted return that was more than double than the 5-sector.

S&P 500 Monthly 30-Groups - Table 2.12

VG. % RETURN	S&P 500	1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
1M	0.99	1.26	1.29	1.10	0.94	1.05	1.18
3M	3.19	3.75	3.81	3.25	2.76	3.12	3.54
6M	6.71	7.80	7.89	6.75	5.69	6.48	7.37
12M	14.31	16.25	16.21	13.60	11.34	13.22	15.51
24M	30.43	36.25	35.48	28.29	22.43	27.68	34.00
36M	49.60	61.19	59.31	45.35	34.19	43.68	54.81
		1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
%OUTP 1M		53	52	52	51	53	51
%OUTP 3M		54	51	47	47	50	61
%OUTP 6M		53	52	49	43	49	53
%OUTP 12M		56	54	53	41	53	54
%OUTP 24M		65	65	45	36	53	50
%OUTP 36M		69	69	41	30	51	54
		1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
# AVG TRADES PER MONTH		38.23	25.57	21.24	15.02	12.09	10.94
# TRADES TOTAL		8830	5906	4907	3469	2792	2527
	S&P 500	1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
MAX DRAWDOWN	-30.17	-16.50	-19.71	-26.88	-31.55	-38.47	-33.36
	S&P 500	1M ROC	2M ROC	3M ROC	6M ROC	9M ROC	12MROC
TOTAL RETURN	847	1741	1615	929	553	855	1333
RETURN / DD	28.08	105.49	81.96	34.56	17.53	22.22	39.96

GLOBAL PORTFOLIO

The idea behind the global portfolio was to switch between the US and the European strategy, to see if performance and risk/return could be improved. To do so, I first had to choose two strategies from both sides of the Atlantic. In Europe I chose the 3-m-ROC with one sector as it provided one of the best total returns and risk-adjusted returns with less drawdown than the Stoxx index. In the US I choose the 3-m-ROC with five sectors. The data was taken from previous tests and started on 30.09.1987. To do a currency adjusted and more realistic test I had to retest the European portfolios with prices of the sectors in USD. The next step was to determine when to be invested in which strategy. For that I used relative strength with a moving average to trigger the signal. I used a 6-month moving average, that is, the average relative strength for the last six months. I examined on the basis that the European strategy would be bought if the relative strength of the European versus the US strategy crossed its moving average from below and sold if the moving average was crossed from above. As can be seen on Table 20 the total return and risk-adjusted return was only higher versus the S&P 500 portfolio and lower than the Stoxx portfolio. The main problem lies in turnover as the global portfolio rose to 1,241 total trades, which is 50% more than the US strategy and more than six fold of the European strategy. Thus, the out performance would be lost in trading costs. I also examined whether it made sense to switch between similar strategies as those strategies have a correlation of 0.94. Looking at Table 20 and having in mind that the correlation of these two strategies is at 0.94 it doesn't make sense to trade such a portfolio because diversification wasn't provided.

Table 20 - Global Portfolio

	S&P 500 1M 5 Groups	Stoxx 1M 1 Sector	Global Portfolio
MAX DRAWDOWN	-28	-30	-32.3
TOTAL RETURN	398	773	536
RETURN/DRAWDOWN	14.2	25.7	16.67
TOTAL TRADES	802	201	1292

CONCLUSION

The results have shown on both the weekly and monthly strategies in Europe and the monthly in US that buying past top performers and selling them when they drop below a rank makes money and outperforms the buy & hold of the benchmark indices. The best results were achieved in the monthly strategies, as they were able to pick major trends but avoided trading too much. Increasing portfolio size didn't mean that diversification or profitability could be improved as we can see when comparing the DJ Stoxx 6-Sectors Monthly with the DJ Stoxx 1-Sector Monthly (table 2.8 and table 2.5).

FURTHER DEVELOPMENTS

This article offers a good foundation; nevertheless these strategies offer a lot more possibilities. Recent developments in the financial markets have been encouraging, as new ETFs have, more frequently, been offered by exchanges on both sides of the Atlantic. This helps to tremendously reduce trading costs as one can easily trade a whole sector or group. In Europe the development has been more innovative with futures contracts on the sector indices being offered. Trading costs for futures versus trading ETFs should be significantly lower. It also enables the ability to go short, thus opening the door for price momentum strategies to be used to reduce market risk.

REFERENCES

- Chan, Louis K. C., Narasimhan Jegadeesh, and Josef Lokonishok, 1996, "Momentum Strategies," *Journal of Finanace* v51n5, 1681-1713.
- De Bondt, W. F. M., and R. H. Thaler, 1985, "Does The Stock Market Overreact?," *Journal of Finance* v40, 793-805.
- Jegadeesh, Narasimhan, and Sheridan Titman, 1993, "Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency," *Journal of Finance* v48n1, 65-91.
- Jegadeesh, Narasimhan, 1990, "Evidence of Predictable Behavior of Security Returns," *Journal of Finance* v45n3, 881-898.
- Kaufman, Perry J., 1998, Trading Systems and Methods, John Wiley & Sons, New York.

Market Internal Analysis In Asia

Ted Yi-Hua Chen

IT'S A MARKET OF STOCKS

Wall Street proverbs are full of truisms. This one goes, "The stock market is a market of stocks."

At a time when many technical analysts focus on the analysis of stock market indices by developing and applying far too many techniques and indicators, they are overlooking simple technical indicators that reflect the notion that the stock market is a market of stocks.

If a technician spends most of the day looking at the stock market index, trying hard to fine-tune or optimize the oscillators, or drawing the perfect trend line, he may be missing the point. After all, we have a market of stocks, not a stock market. Worrying about "the market" is at best an interesting intellectual exercise and at worst a total distraction from the main pursuit of investing, which is to find companies or groups with the greatest potential for capital appreciation within a given time horizon. Worrying what the stock market index will do tomorrow adds little value to the main task at hand, which is to look for what opportunities are out there. This requires a deeper look into the stock market - a market of stocks - to arrive at a comprehensive view of the market. In my view, market internal indicators are the perfect tools to serve such purpose.

MARKET INTERNAL INDICATOR

Unlike many other technical indicators, which derive from stock prices and market indices, market internal indicators are technical indicators, which reveal a different but important dimension of the stock market movements - the level of participation. Why is market internal important? Let's start with a basic definition. A bull market - a generic term but hard to define with precision. What is a bull market? The following definitions are quite common from the experts:

- *A broad upward movement, normally averaging at least 18 months, which is interrupted by secondary reactions.*

  - Martin Pring, Technical Analysis Explained
- *A prolonged rise in the prices of stocks, bonds, or commodities, usually last at least a few months and are characterized by high trading volume.*

  - Barron's, *Dictionary of Finance and Investment Terms*
- *A long-term (months to years) upward price movement characterized by a series of higher intermediate (weeks to months) highs interrupted by a series of higher intermediate lows.*

  - Victor Sperandeo, Trader Vic II- *Principles of Professional Speculation*
- *A prolonged period of rising prices, usually by 20% or more.*

  - Investorwords.com

It's clear that most definitions agree that a bull market requires not only the market index to rise substantially, but also that the price advances need to be broadly based. But, when it comes to the quantitative measures of a bull market, most definitions are rather ambiguous, or even absent, particularly with regard to the level of participation. There are three quantifiable measures for a bull market - the extent of the rise, the duration of the rise and the participation of the rise in the stock market. Although it's not viable to come up with a distinct measure of a bull market, for the first two factors (extent and duration of the rise), it's acceptable that a bull market should see minimum 20% rise in the stock market index for a prolonged period (months to years). The hard part is to gauge the level of participation of the rises in the stock market in relation to bull and bear market. I believe that studies of market internals provide great insights into the dynamics of stock market movements.

This article explores the viability of a particular type of market internal indicator - the N-day Diffusion Index, denoting the percentage of stocks above their own N-day moving average - and its related indicators, hoping to derive at some meaningful conclusions and practical applications in stock market analysis. Three markets have been selected for discussion with over 12 years' history. They have been chosen to cover three types of general trends over that period - a rising trend (Hong Kong), a cyclical sideways trend (Korea) and a declining trend (Thailand) (Chart 1).

Chart 1 - Performance of Three Asian Markets Since 1990 (Jan. 1990 = 100)

Source: Thomson Datastream

N-DAY DIFFUSION INDEX, A LEADING INDICATOR

The N-day Diffusion Index (N-day DI) is based on the percentage of stocks in a market or a sector that are above their N-day moving average. For example, among the top 100 stocks in the Korean Stock Exchange, 38 of those stocks are above their 50-day moving average and 62 are below their 50-day moving average, then the 50-day Diffusion Index (50-day DI) for the Top 100 Korean stocks is at 38%. In the same way, we can work out the 200-day DI for the Top 100 Korea stocks (34% as of August 21st, 2002). The formula of %N-day Index should be:

$$\text{N-day DI} = \frac{\textit{Number of stocks above their own N – day moving average}}{\textit{total number of stock in the group under study}} \times 100\%$$

Chart 2 shows the recent history of 50-day DI and 200-day DI for the top 100 stocks traded on the Korean Stock Exchange.

Chart 2 - Recent History of %50-Day DI and %200-Day DI for the Top 100 Korean Stocks

Source: Thomson Datastream

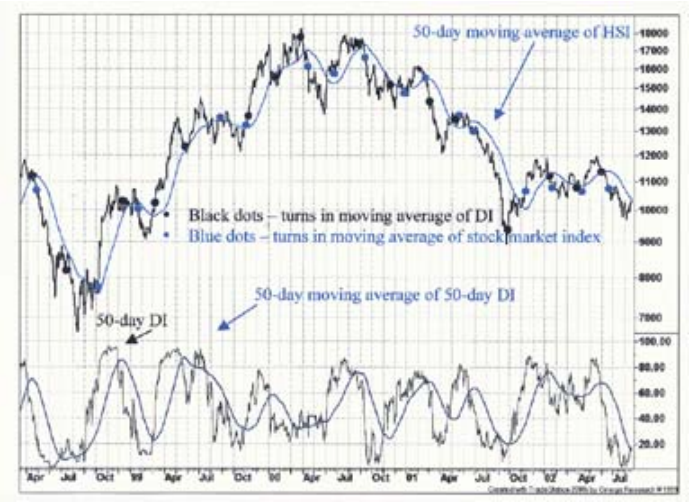
As the formula suggests, the N-day DI is an oscillator fluctuating between 0% and 100%. It's not a smooth oscillator and can be quite volatile depending on the parameter N (number of days used for moving average of the stock price), thus another N-day moving average is applied to the N-day DI to smooth out the noise. Furthermore, when comparing the moving average of the N-day DI to the moving average of stock price (or market index), there are some important differences between the two which can help technicians gain better insights into the stock market movements.

My research in many Asian markets has found that, if the same number of days is applied for the moving average smoothing, the moving average of the N-day DI is significantly different from the moving average of the stock market index in two aspects:

1. The moving average of the N-day DI generally has more turns than the moving average of the stock market index;
2. The turns in the moving average of the N-day DI generally lead the turns in the moving average of the stock market index.

The next three charts (Chart 3 to 5) show the recent history of the 50-day moving average of the stock market index and of the 50-day DI in Hong Kong, Korea and Thailand respectively. Turning points in the 50-day moving average of 50-day DI are plotted as red dots while turning points in the 50-day moving average of the stock market index are plotted as blue dots.

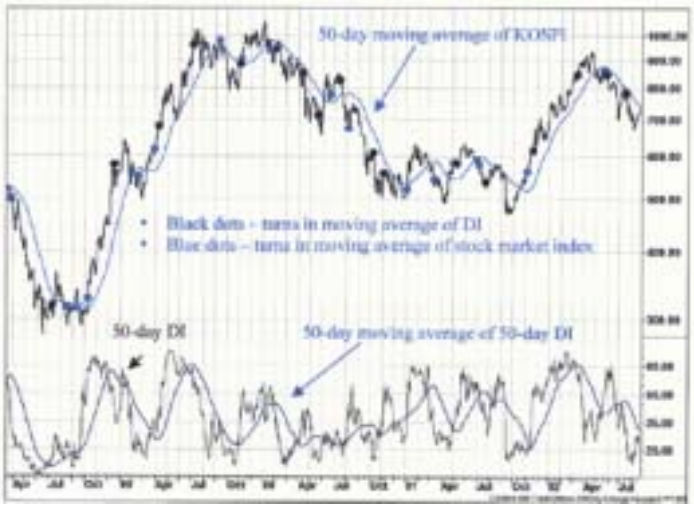
Chart 3 - Hong Kong: Hang Seng Index, 50-Day DI (top 100) and Their 50-Day Moving Average


50-day moving average of HSI
Black dots – turns in moving average of DI
Blue dots – turns in moving average of stock market index
50-day moving average of 50-day DI
50-day DI

Source: Thomson Datastream

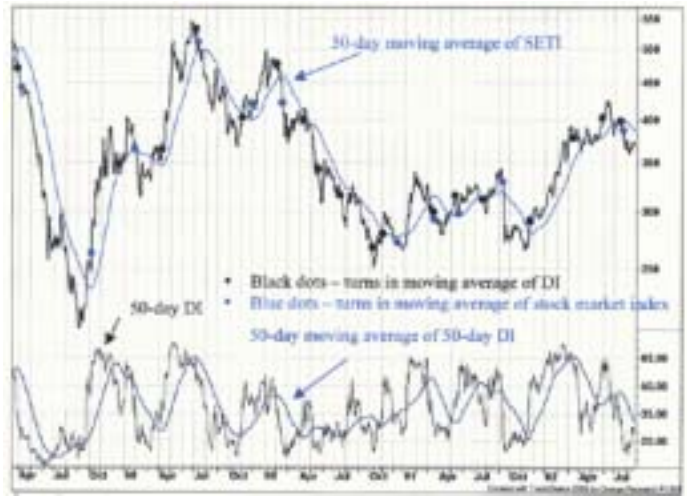
Note: *as the 50-day moving average could produce whipsaws especially during non-directional market condition, I applied a 20-day swing high (or low) to define a peak (or trough) in the moving average to filter out noise. In other words, a qualified peak should be the peak for at least the last 20 days and a qualified trough should be the low for at least the last 20 days.*

Chart 4 - Korea: KOSPI, 50-Day DI (top 100) and Their 50-day Moving Average


50-day moving average of KOSPI
Black dots – turns in moving average of DI
Blue dots – turns in moving average of stock market index
50-day DI
50-day moving average of 50-day DI

Source: Thomson Datastream

Chart 5 - Thailand: SET Index, 50-Day DI (Top 100) and Their 50-day Moving Average



Source: Thomson Datastream

The following three tables (Table 1 to 3) list all the turns in the moving average of DI and the moving average of stock market index in Hong Kong, Korea and Thailand from 1991 to 2002.

Table 1 - Comparison of Turning Points: Hong Kong (1991 - 2002)

Date	Hang Seng Index (HSI) closing	50-day moving average of 50-day DI	50-day moving average of HSI	HSI value when moving average of DI at peak	HSI value when moving average of HSI at peak	HSI value when moving average of DI at trough	HSI value when moving average of HSI at trough	number of days DI lead at peaks	number of days DI lead at troughs
1/23/1991	3090.4	45.78	3050.68	-	-	3090.4	-		
4/8/1991	3812.01	94.68	3561.45	3812.01	-	-	-	45	
5/23/1991	3778.79	66.88	3732.78	-	3778.79	-	-		
8/27/1991	3829.79	41.44	3679.81	-	-	-	3829.79		
8/28/1991	3668.64	41.12	3679.64	-	-	3668.64	-		-1
9/6/1991	3970.91	77.75	3972.33	3970.91	-	-	-		
10/25/1991	3971.9	51.99	3979.53	-	-	-	3971.9		
11/6/1991	4173.57	50.28	3999.85	-	-	4173.57	-		-12
3/30/1992	4878.27	85.77	4816.3	4878.27	-	-	-		
4/24/1992	5330.17	79.54	4961.05	-	-	5330.17	-		
7/1/1992	6134.75	90.92	5803.37	6134.75	-	-	-	28	
7/29/1992	5857.29	76.68	5968.13	-	5857.29	-	-		
10/1/1992	5528.84	22.42	5687.48	-	-	5528.84	-		13
10/14/1992	5806.77	35.25	5864.97	-	-	-	5806.77		
11/27/1992	5866.67	62.46	5859	5866.67	-	-	-	3	
11/30/1992	5810.63	62.28	5960.38	-	5810.63	-	-		
1/20/1993	5877.02	35.25	5612.24	-	-	5877.02	-		19
2/8/1993	5786.65	42.71	5557.79	-	-	-	5786.65		
4/21/1993	6768.39	84.84	6300.22	6768.39	-	-	-		
5/21/1993	7169.96	82.84	6592.95	-	-	7169.96	-		
6/3/1993	7155.29	86.75	6822.86	7155.29	-	-	-	47	
7/20/1993	6846.81	63.64	7151.9	-	6846.81	-	-		
8/10/1993	7329.81	45.52	7098.48	-	-	-	7329.81		-21
8/27/1993	7422.98	40.82	7149.3	-	-	7422.98	-		
1/5/1994	12167.9	90.66	10005.48	12167.9	-	-	-	50	
2/24/1994	10432.02	66.94	11230.38	-	10432.02	-	-		
4/25/1994	9136.11	13.81	9711.56	-	-	9136.11	-		
6/20/1994	8898.18	37.99	9186.26	8898.18	-	-	-		
7/12/1994	8591.45	33.73	8998.57	-	-	8591.45	8591.45		0
9/23/1994	9832.47	70.87	9595.19	9832.47	-	-	-	11	
10/4/1994	9504.12	70.68	9655.15	-	9504.12	-	-		
2/2/1995	7342.65	7.01	7878.58	-	-	7342.65	-		39
3/13/1995	8111.27	31.44	7764.02	-	-	-	8111.27		
7/18/1995	9616.98	76.96	9319.4	9616.98	-	-	-	21	
8/8/1995	9303.82	73.68	9381.17	-	9303.82	-	-		
9/1/1995	9196.47	61.01	9282.91	-	-	-	9196.47		
10/13/1995	9883.78	51.88	9400.65	-	-	9883.78	-		-42
11/7/1995	9732.41	56.23	9662.79	9732.41	-	-	-		
1/1/1996	10073.39	43.94	9734.39	-	-	10073.39	-		
3/8/1996	11217.79	86.55	11049.75	11217.79	-	-	-	31	
4/8/1996	11139.88	67.36	11152.13	-	11139.88	-	-		
5/17/1996	10816.85	37.51	10856.7	-	-	10816.85	10816.85		0
6/25/1996	10982.77	44.34	10928.89	-	-	-	10982.77		28
7/23/1996	10865.31	54.34	10975.05	-	10865.31	-	-		
8/9/1996	11104.03	54.4	10932.07	-	-	-	11104.03		
12/11/1996	13189.6	84.78	12781.48	13189.6	-	-	-	85	
3/6/1997	13416.36	59.87	13442.19	-	13416.36	-	-		
4/29/1997	12600.42	40.34	12803.1	-	-	12600.42	-		3
5/2/1997	13081.7	40.97	12783.97	-	-	-	13081.7		
7/14/1997	15370.94	78.19	14553.85	15370.94	-	-	-	45	
8/28/1997	14876.1	71.16	15613.33	-	14876.1	-	-		
12/17/1997	10892.7	8.02	11127.42	-	-	10892.7	-		63
2/18/1998	10670.95	26.37	9994.38	-	-	-	10670.95		
4/16/1998	11167.78	70.69	11099.89	11167.78	-	-	-	12	
4/28/1998	10678.61	66.83	11158.04	-	10678.61	-	-		
7/14/1998	8178.93	7.15	8793.56	-	-	8178.93	-		85
10/7/1998	7744.72	31.58	7563.93	-	-	-	7744.72		
12/10/1998	10315.44	85.6	9773.2	10315.44	-	-	-	42	
1/21/1999	10048.56	57.67	10262.5	-	10048.56	-	-		
3/5/1999	10241.12	23.24	9804.43	-	-	-	10241.12		
3/8/1999	10263.99	23.07	9826.31	-	-	10263.99	-		-3
5/25/1999	12346.91	87	12159.59	12346.91	-	-	-	93	
8/26/1999	13608.38	64.82	13496.85	-	13608.38	-	-		
11/3/1999	13257.33	31.29	13105.36	-	-	-	13257.33		
11/9/1999	13669.7	30.62	13111.16	-	-	13669.7	-		-8
1/17/2000	15574.56	58.21	15717.66	15574.56	-	-	-	67	
3/24/2000	17784.57	31.82	16611.79	-	-	17784.57	-		91
4/14/2000	16142.76	33.33	17048.51	-	16142.76	-	-		
6/23/2000	15738.09	45.86	15214.72	-	-	-	15738.09		
8/23/2000	17427.4	76.2	17026.96	17427.4	-	-	-	21	
9/13/2000	16829.78	72.9	17341.29	-	16829.78	-	-		
11/17/2000	15180.85	24	15418.1	-	-	15180.85	-		39
12/26/2000	14738.21	45.1	14995.54	-	-	-	14738.21		
2/20/2001	15527.36	67.83	15482.27	-	15527.36	-	-		
3/1/2001	14360.56	68.43	15463.21	14360.56	-	-	-	-9	
5/8/2001	13540.81	39.22	13252.26	-	-	13540.81	-		13
5/21/2001	13721.27	41.78	13123.49	-	-	-	13721.27		

Table 2 - Comparison of Turning Points: Korea (1991 - 2002)

Date	KOSPI closing	50-day moving average of 50-day DI	50-day moving average of KOSPI	KOSPI value when moving average of DI at peak	KOSPI value when moving average of KOSPI at peak	KOSPI value when moving average of DI at trough	KOSPI value when moving average of KOSPI at trough	number of days DI lead at peaks	number of days DI lead at troughs
2/21/1991	672.1	21.45	660.59	-	-	672.1	-		22
3/15/1991	682.97	29.31	654.06	-	-	-	682.97		
4/16/1991	635.41	49.04	660.1	-	635.41	-	-		
4/25/1991	626.36	50.85	658.76	626.36	-	-	-		
6/26/1991	597.6	16.28	621.4	-	-	597.6	-		19
7/15/1991	635.21	22.23	615.63	-	-	-	635.21		
9/12/1991	683.31	70.34	683.3	683.31	-	-	-	22	
10/4/1991	720.53	61.34	699.76	-	720.53	-	-		
1/3/1992	624.23	28.06	647.23	-	-	624.23	-		21
1/24/1992	658.04	31.41	632.15	-	-	-	658.04		
3/12/1992	619.11	51.28	643.11	619.11	619.11	-	-	0	
4/29/1992	612.72	31.6	606.11	-	-	612.72	-		
5/20/1992	579.91	33.73	588.25	579.91	-	-	-		
6/10/1992	562.87	32.46	585.77	-	-	562.87	-		
6/30/1992	552.03	34.68	580.36	552.03	-	-	-		
8/25/1992	494.5	16.27	517.73	-	-	494.5	-		3
8/28/1992	518.56	17.25	514.56	-	-	-	518.56		
12/29/1992	678.44	80.8	638.11	678.44	-	-	-		
1/27/1993	694.57	80.88	670.92	694.57	-	-	-	28	
2/24/1993	672.81	73.6	682.2	-	672.81	-	-		
4/6/1993	697.11	38.45	660.92	-	-	-	697.11		
4/8/1993	695.07	38.27	661.17	-	-	695.07	-		-2
6/16/1993	759.26	82.76	731	759.26	-	-	-	44	
7/30/1993	730.5	66.66	754.4	-	730.5	-	-		
9/24/1993	702.2	18.84	710.08	-	-	702.2	-		14
10/8/1993	714.58	35.24	704.43	-	-	-	714.58		
12/17/1993	874.1	84.32	791.01	874.1	-	-	-	94	
3/21/1994	885.65	48.03	909.85	-	885.65	-	-		
4/27/1994	897.43	37.51	892.93	-	-	897.43	-		8
5/5/1994	922.33	39.64	890.21	-	-	-	922.33		
6/23/1994	935.57	60.9	925.5	935.57	-	-	-	25	
7/18/1994	944.8	56.83	939.88	-	944.8	-	-		
8/10/1994	930.21	43.32	934.69	-	-	-	930.21		
9/15/1994	988.75	39.44	949.09	-	-	988.75	-		-36
11/30/1894	1074.41	80.53	1090.14	1074.41	-	-	-	8	
12/8/1994	1053.7	78.22	1093	-	1053.7	-	-		
2/16/1995	923.49	16.89	981.43	-	-	923.49	-		
5/15/1995	887.11	36.99	918.83	887.11	-	-	-		
6/28/1995	872.68	29.19	886.29	-	-	872.68	-		2
6/30/1995	884.41	29.51	885.62	-	-	-	884.41		
11/10/1995	965.95	70.02	985.59	965.95	-	-	-	4	
11/14/1995	948.34	69.56	986.61	-	948.34	-	-		
1/26/1996	867.38	14.61	899.27	-	-	867.38	-		60
3/26/1996	859.07	34.27	864.45	-	-	-	859.07		
5/28/1996	906.21	73.87	921.15	906.21	-	-	-	14	
8/11/1996	888.68	70.89	927.98	-	888.68	-	-		
8/29/1996	766.16	16.35	821.59	-	-	766.16	-		
11/7/1996	741.76	35.49	790.84	741.76	-	-	-		
1/10/1997	648.69	13.26	699.54	-	-	648.69	-		33
2/12/1997	712.5	28.93	678.13	-	-	-	712.5		
3/20/1997	642.86	45.9	683.29	-	642.86	-	-		
3/21/1997	627.63	46.02	682.87	627.63	-	-	-		
4/2/1997	678.86	43.39	676.86	-	-	-	678.86		
4/30/1997	703.23	40.77	677.05	-	-	703.23	-		1
5/1/1997	703.23	40.81	676.89	-	-	-	703.23		
7/21/1997	740.93	70.05	751.66	740.93	-	-	-	21	
8/11/1997	765.07	58.74	756.06	-	765.07	-	-		
12/3/1997	379.31	3.68	541.5	-	-	379.31	-		51
1/23/1998	486.86	35.21	426.16	-	-	-	486.86		
3/20/1998	525.95	67.36	521.5	525.95	-	-	-	7	
3/27/1998	503.08	62.76	524.41	-	503.08	-	-		
6/30/1998	297.88	4.3	347.67	-	-	297.88	-		51
8/20/1998	316.59	31.38	317.35	-	-	-	316.59		
9/14/1998	314.24	41.42	321.81	-	314.24	-	-		
9/16/1998	313.17	41.56	321.56	313.17	-	-	-		
10/8/1998	305.22	32.78	312.46	-	-	305.22	-		1
10/9/1998	327.96	32.91	312.15	-	-	-	327.96		
12/23/1998	553.53	94.56	447.42	553.53	-	-	-	56	
2/17/1999	551.77	70.33	570.63	-	551.77	-	-		
3/29/1999	601.07	44.57	560.76	-	-	601.07	-		1
3/30/1999	618.05	44.6	560.75	-	-	-	618.05		
5/20/1999	708.6	88.29	688.22	708.6	-	-	-	116	
9/13/1999	980.91	53.38	950.31	-	980.91	-	-		
11/3/1999	887.15	27.34	885.51	-	-	887.15	-		5
11/8/1999	907.6	27.92	882.9	-	-	-	907.6		
1/5/2000	986.31	36.56	968.09	986.31	-	-	-	14	

Table 3 - Comparison of Turning Points: Thailand (1991 - 2002)

Date	SET Index (SETI) closing	50-day moving average of 50-day DI	50-day moving average of SETI	SETI value when moving average of DI at peak	SETI value when moving average of SETI at peak	SETI value when moving average of DI at trough	SETI value when moving average of SETI at trough	number of days DI lead at peaks	number of days DI lead at troughs
1/29/1991	637.87	71.71	611.05	-	-	-	637.87		
4/8/1991	874.64	88.6	801.6	874.64	-	-	-	37	
5/15/1991	824.49	74.35	868.9	-	824.49	-	-		
7/15/1991	677.83	49.44	786.4	-	-	677.83	-		
9/18/1991	718.48	64.78	701.88	718.48	-	-	-		
12/5/1991	670.07	52.38	653.68	-	-	-	670.07		
12/12/1991	699.69	51.53	656.96	-	-	699.69	-		-7
2/28/1992	782.85	76.41	758.95	782.85	-	-	-	52	
4/20/1992	808.84	50.03	809.71	-	808.84	-	-		
5/7/1992	710.72	47.16	799.69	-	-	710.72	-		
6/18/1992	755.73	51.11	744.32	755.73	-	-	-		
6/30/1992	751.45	48.03	735.11	-	-	751.45	-		14
7/14/1992	741.87	49.35	728.44	-	-	-	741.87		
10/1/1992	859.68	59.98	782.05	859.68	-	-	-		
10/23/1992	902.76	54.5	823.05	-	-	902.76	-		
12/7/1992	860.33	64.63	859.83	-	860.33	-	-		
1/5/1993	880.91	76.46	885.01	880.91	-	-	-		
1/18/1993	937.99	74.96	881.99	-	-	-	937.99		-13
3/5/1993	898.74	63.69	946.48	-	-	898.74	-		
3/17/1993	906.26	64.31	947.9	-	906.26	-	-		
4/2/1993	857.2	66.56	932.21	857.2	-	-	-		
6/10/1993	844.01	54.64	855.66	-	-	844.01	-		1
6/11/1993	853.14	54.78	855.58	-	-	-	853.14		
10/5/1993	1019.45	64.23	968.93	1019.45	-	-	-		
12/27/1993	1608.12	53.94	1358.17	-	-	1608.12	-		
2/3/1994	1463.9	59.55	1502.07	1463.9	-	-	-	11	
2/14/1994	1422.2	59.15	1510.66	-	1422.2	-	-		
5/17/1994	1302.85	31.18	1260.83	-	-	1302.85	-		1
5/18/1994	1325.47	31.38	1260.17	-	-	-	1325.47		
7/26/1994	1346.5	52.97	1333.1	1346.5	-	-	-		
8/23/1994	1471.85	50.34	1359.63	-	-	1471.85	-		
10/3/1994	1488.55	62.04	1473.12	1488.55	-	-	-	36	
11/8/1994	1495.61	56.22	1508.51	-	1495.61	-	-		
12/13/1994	1305.58	46.73	1443.39	-	-	1305.58	-		
4/17/1995	1194.13	81.71	1230.83	1194.13	-	-	-		
5/5/1995	1283.06	81.24	1204.46	-	-	-	1283.06		
5/17/1995	1355.72	82.18	1217.26	1355.72	-	-	-		
7/17/1995	1447.09	80.49	1390.06	1447.09	-	-	-	16	
8/2/1995	1378.66	79.92	1401.47	-	1378.66	-	-		
10/16/1995	1317.04	64.75	1315.72	-	-	1317.04	-		
11/13/1995	1197.27	66.45	1287.93	1197.27	-	-	-		
11/29/1995	1198.59	64.29	1262.72	-	-	1198.59	-		33
1/1/1996	1280.81	66.57	1242.72	-	-	-	1280.81		
1/9/1996	1349.16	68.47	1250.85	1349.16	-	-	-		
1/22/1996	1389.43	65.65	1276.38	-	-	1389.43	-		
3/8/1996	1308.97	73.4	1362.83	-	1308.97	-	-		
4/5/1996	1333.34	76.43	1335.83	1333.34	-	-	-		
5/16/1996	1302.34	59.7	1307.15	-	-	1302.34	-		
5/31/1996	1311.91	62.71	1311.26	-	1311.91	-	-		
7/1/1996	1247.08	64.45	1284.2	1247.08	-	-	-		
8/20/1996	1071.41	44.12	1178.39	-	-	1071.41	-		
11/28/1996	938.42	78.68	967.57	938.42	-	-	-		
2/12/1997	722.57	66.1	824.48	-	-	722.57	-		
3/18/1997	693.87	72.1	761.12	693.87	-	-	-		
5/1/1997	681.29	47.82	704.57	-	-	681.29	-		
7/11/1997	628.55	87.38	563.58	628.55	-	-	-	60	
7/15/1997	625.66	87.06	562.27	-	-	-	625.66		
9/9/1997	565.01	71.38	608.24	-	565.01	-	-		
12/31/1997	372.69	48.6	416.91	-	-	372.69	-		28
1/28/1998	434.22	55.88	385.2	-	-	-	434.22		
4/8/1998	444.33	86.19	500.96	-	444.33	-	-		
4/20/1998	434.37	86.86	488.45	434.37	-	-	-		
7/3/1998	273.74	51.68	330.84	-	-	273.74	-		96
10/7/1998	263.23	25.12	234.67	-	-	-	263.23		
10/12/1998	290.8	24.32	236.16	-	-	290.8	-		
12/25/1998	356.16	81.04	347.77	356.16	-	-	-	34	
1/28/1999	368.16	71.2	368.26	-	368.16	-	-		
3/24/1999	360.35	61.78	350.9	-	-	360.35	-		15
4/8/1999	365.09	63.18	346.46	-	-	-	365.09		
5/13/1999	476.89	70.6	394.48	476.89	-	-	-	60	
7/12/1999	511.87	58.38	499.6	-	511.87	-	-		
10/6/1999	395.09	39.84	427.45	-	-	395.09	-		55
11/30/1999	422.12	47.84	399.65	-	-	-	422.12		
1/4/2000	498.46	58.56	428.86	498.46	-	-	-	43	
2/16/2000	422.83	47.04	461.54	-	422.83	-	-		
3/23/2000	399.03	36.76	428.62	-	-	399.03	-		
5/24/2000	319.68	66.1	383.06	319.68	-	-	-		

Table 4 - The Summary of the Statistics from Three Markets (1991 - 2002)

Statistics	Hong Kong	Korea	Thailand
Number of peaks in the 50-day moving average of 50-day DI	24	28	32
Number of peaks in the 50-day moving average of stock market index	20	21	17
Number of times when peak in DI leads peak in stock market index	**17**	**15**	**11**
Average number of days led by moving average of DI at peaks	**33**	**29**	**43**
Number of troughs in the 50-day moving average of 50-day DI	23	27	31
Number of troughs in the 50-day moving average of stock market index	21	22	16
Number of times when trough in DI leads trough in stock market index	**11**	**18**	**10**
Average number of days led by moving average of DI at troughs	**19**	**17**	**24**

The evidence from three Asian markets clearly supports the argument that the Diffusion Index is a leading indicator of stock market indices.

I liken the 'leading' aspect of the Diffusion Index (DI) over the stock market index to the relationship between the gas pedal and the speed of the car. The fastest speed always happens after a powerful press of the gas pedal, as fuel injection to the engine is mainly responsible for the acceleration of a car. By knowing how hard the pedal is pressed, we will have a pretty good idea of how fast the car will travel in the moment that follows. In the case of the stock market, an increase in liquidity, which, to a great extent, can be reflected by sustained rise in the N-day Diffusion Index, is mainly responsible for the stock market advance. By knowing how many stocks are participating the rally, we will have a pretty good idea of how powerful and sustainable the market rally will likely to be.

Caveat: *occasionally, a rise in the N-day DI is not followed by a subsequent rise in the stock market index or a fall in the N-day DI is not followed by a subsequent fall in the stock market index. This often occurs when the long-term trend of the stock market is strongly upward (or firmly downward), which reflects a situation where the market moves towards an equilibrium level from a massively undervalued (or overvalued) level. Such anomaly is similar to the situation when a car is so overburdened that it cannot accelerate no matter how hard the gas pedal is pressed.*

THE PROBLEM WITH A MOVING AVERAGE SYSTEM

Trading systems based on two moving averages of different time spans have been well known to technical traders for years. But there are problems with trading systems of this nature. Generally speaking, a moving average of price is reliable in identifying trends, especially the long-term trend. However, due to its lagging effect, signals are often too late, especially for the short to intermediate-term trend. Most dual moving average trading systems lack the flexibility to strike a balance between trade reliability (strategy) and trade efficiency (tactic). In other words, these systems use the moving average as the tool for identifying trend as well as for timing the trade.

The 'leading' function of the Diffusion Index over the stock market index has profound implication for improving trading system based on dual moving averages. Table 5 lays out the key characteristics of a moving average of both stock market index and the Diffusion Index. Although, the moving average of the Diffusion Index, as a non-price derived indicator, can give premature signals for long-term market trend change, they are most effective in timing the short to intermediate-term trend reversals.

Table 5 - Key Characteristics of Price Moving Average and DI Moving Average

	Moving Average of Stock Market Index	Moving Average of Diffusion Index
Type of indicator	Price trend following indicator	Oscillator between 0% and 100%
Frequency of turns	Fewer turning points	More turning points
Time lead/lag	Lagging	Leading
Pros	• reliable signals • follow price closely • more effective in identifying long-term trend	• preemptive warning signals • more effective tool in catching intermediate-term trend reversals
Cons	• late signals • less effective catching intermediate-term trend reversals	• Premanture signals, especially for long term trends • a non-price derived indicator, thus hard to use for stop-loss purpose

Perhaps, incorporating the Diffusion Index into a moving average trading system could greatly improve the trade efficiency.

DIMA TRADING SYSTEM

I have designed a trading system to take advantage of the best from both the price moving average and the DI moving average. In a nutshell, the system defines the trading strategy (buy only or sell only) by the direction of a long-term moving average of the stock market index (say 200-day moving average). It then times the entry/exit by the turns in the moving average of an intermediate-term Diffusion Index (say the moving average of the 50-day DI). A 20-day swing high (or swing low) is applied to filter out necessary noises. In other words, the system will wait 20 days after a peak (or a trough) to confirm a turning point in the moving average. Due to the fact that the moving average of DI generally leads the moving average of the stock market index, the filtering process does not introduce signal lag, which is a common problem with the price moving average. I have named the system DIMA (Diffusion Index with Moving Average). Here are the trading rules:

- **Buy:** when the 200-day moving average of the stock market index rises and the 50-day moving average of the 50-day DI makes a trough (applying a 20-day swing low as the filter);
- **Exit long position:** when the 50-day moving average of the 50-day DI makes a peak (applying a 20-day swing high as the filter);
- **Sell:** when the 200-day moving average of the stock market index declines and the 50-day moving average of the 50-day DI makes a peak (applying a 20-day swing high as the filter);
- **Exit short position:** when the 50-day moving average of the 50-day DI makes a trough (applying a 20-day swing low as the filter).

Chart 6 - Illustrating the DIMA Trading System

Source: Thomson Datastream

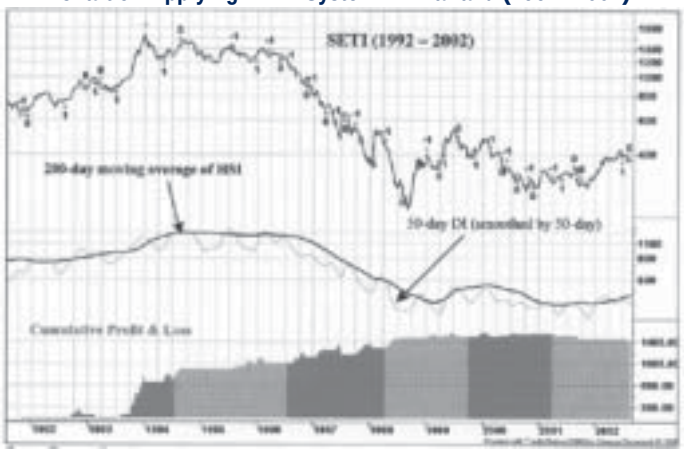
Chart 7 - Applying DIMA System in Hong Kong (1992 - 2002)

Source: Thomson Datastream

Chart 8 - Applying DIMA System in Korea (1992 -2002)

Source: Thomson Datastream

Chart 9 - Applying DIMA System in Thailand (1992 -2002)



Source: Thomson Datastream

The DIMA system testing results (Table 7) from three Asian markets clearly demonstrates the added efficiency by incorporating market internal gauge into a traditional trading system. In the Appendix, I list testing results for another eight Asian markets, which are in line with the conclusions drawn here.

Table 7 - Comparison of Two Trading Systems' Results (DIMA vs. MA only*)

1992 to 2002	Hong Kong		Korea		Thailand	
Trading Instrument	Hang Seng Index		KOSPI		SETI	
Trading system (DIMA or MA)	DIMA	*MA*	DIMA	*MA*	DIMA	MA
Number of trades (1)	23	*21*	22	*13*	23	*17*
% of winning trades (2)	56.5%	*47.6%*	45.5%	*61.5%*	60.9%	*47.1%*
Average win/loss ratio (3)	3.25	*1.66*	2.36	*2.21*	3.42	*3.64*
Total winning expectation (1) x (2) x (3)	**42.2**	***16.6***	**23.6**	***17.7***	**47.9**	***29.1***

** MA only system - A trading system that substitutes the 50-day DI with 50-day moving average of the stock market index in DIMA system.*

The purpose of showing the results of the DIMA trading system is to illustrate the added value of N-day DI to stock market analysis rather than to attempt spread around an ultimate trading system. There are other areas in stock market analysis where market internal indicators can be of great help. Here, I will discuss using market internal gauge as a contrarian indicator.

DIFFUSION VOLATILITY INDEX, A CONTRARIAN INDICATOR

The theory of contrary opinion relates to the innate herd instinct that afflicts investors. A basic tenet of this theory is that people feel most comfortable when they are in the mainstream. For this reason, investors form a consensus opinion. They reinforce each other's belief and block out evidence that would support other conclusions. In the stock market, this behavior leads to excessive optimism just before a stock market peak, and general pessimism at a stock market trough. Contrarian investing is essentially to find out what the consensus opinion is, and then act in just the opposite manner when the extent of one-sided opinion reaches the extreme.

The pressing issue with contrarian investing is how to measure the consensus. Most technicians look at the sentiment indicators such as put/call ratio, volatility index, bullish and bearish sentiment figures compiled by services from Investors Intelligence, Market Vane and the like. After years of research, I have found market internal indicators to be extremely effective in gauging the long-term crowds' psychology in a stock market.

Three distinctive natures of the market internals make it possible for indicators such as the N-day DI to be an effective contrarian indicator:

1. The market internal gauge leads the stock market index;
2. The market internal gauge is objectively measurable; and
3. Unlike most stock market indices, which are heavily influenced by a few large cap stocks, the market internal gauge is derived from a greater number of stocks with equal weighting, enabling itself as a better gauge of overall market sentiment.

The 200-day Diffusion Index is a good indicator that reflects investors' sentiment. When the 200-day DI rises consistently, investors feel most comfortable as most of their stock holdings are showing improving performance. This eventually leads to excessive optimism. When the 200-day DI declines consistently, investors feel uneasy as most of their stock holdings are showing deteriorating performance. This eventually leads to excessive pessimism.

To further enhance market internals as a sentiment indicator, I designed the **N-day Diffusion Volatility Index (N-day DVI)**, which consists of two separate indicators, **DVI+ and DVI-**.

The **N-day DVI+** is, of all the stocks that are above their N-day moving average, the average distance to their N-day moving average (expressed as a percentage of their N-day average).

The N-day DVI- is, of all the stocks that are below their N-day moving average, the average distance to their N-day moving average (expressed as a percentage of their N-day average).

With the invention of the N-day DVI, we are able to find out not only the proportion of stocks in a stock market that are above their N-day moving average, but also the magnitude of the stocks that are above (and below) their N-day moving average. A significant market peak often occurs after a buying frenzy, which results in a very high reading in the DVI+. A significant market trough often occurs after a selling panic, which results in a very high reading in the DVI-.

The following three charts (Chart 10 - 12) display both the 200-day DI and the 200-day DVI (along with the stock market index) from three Asian markets.

Chart 10 - Gauging Investors' Sentiment in Hong Kong (1992 - 2002)

Source: Thomson Datastream

Chart 10 illustrates how DI and DVI are applied to identify stock market peaks and troughs.

1. The 200-day moving average of the 200-day DI generally leads the 200-day moving average of the stock market index. A turn in the 200-day moving average of the 200-day DI should give a forewarning of a pending cyclical trend reversal.
2. A peak in the 200-day DVI+ at a historically overbought region signals the end of a buying frenzy, providing good timing for profit taking and forewarning of a pending bear market.
3. A peak in the 200-day DVI- at a historically oversold region signals the end of a selling panic, providing good timing for short covering and forewarning of a pending bull market.

Chart 11 - Gauging Investors' Sentiment in Korea (1992 - 2002)

Source: Thomson Datastream

Chart 11 shows a recent buying frenzy in Korea in the late first quarter of 2002. Subsequently, the 200-day moving average of the 200-day DI began falling after rising for most of the last two years. Such bearish setup was accompanied by very bullish sentiment among fund managers even after a 20% decline in the second quarter of 2002.

This is a classic picture of a cyclical peak in the making.

Chart 12 - Gauging Investors' Sentiment in Thailand (1992 -2002)

Source: Thomson Datastream

Chart 12 shows a selling panic in mid 2000 when stocks are, on average, trading at a level 20% below their 200-day moving average. This is followed by an upturn in the 200-day moving average of the 200-day DI in the fourth quarter of 2000. Such bullish setup eventually led to a two-year bull market in Thailand.

A REAL-LIFE EXAMPLE

To see how effective the N-day DV and N-day DVI can be used as a long-term trend reversal indicator, let's take a look at a recent presentation I made to a Technical Analysts' Society of Hong Kong (TASHK) meeting held in January 2002. Among all of the stock markets around the world, I chose Pakistan's as the most interesting. It seemed rather controversial at the time as Pakistan was experiencing some political difficulties. Despite all of the bad news, the market internal indicators were actually showing a very constructive picture:

Chart 13 - Gauging Investors' Sentiment in Pakistan (1992 -2002)

Source: Thomson Datastream

1. The 200-day moving average of the 200-day DI (from the top 100 stocks) began rising after falling for over a year;
2. The bullish turn in the DI had led the bullish turn in the 200-day moving average of the KSE All-share index - a sign of confirmation.
3. The bullish turn came after a high reading in the 200-day DVI-, usually a sign that the market has just passed a selling panic.

At year-end, 2002, the top performer among all world equity markets was Pakistan. This was an excellent example of applying market internal as a contrarian indicator.

TWO ISSUES ABOUT THE RESEARCH METHOD

Two issues need to be addressed with regard to the method I used to conduct this research -the statistic error and the survivorship bias.

Issue 1: Statistic Error

Statistic errors are incurred when only the top 100 stocks are included to calculate market internal gauge instead of including all stocks from the market (which could easily reach the range between 800 and 1500). In other words, only a small sample is taken for study, which will certainly introduce statistic error. But, how significant is that statistic error?

Assuming the sample stocks are randomly selected (which will be the issue number 2 for later discussion), the standard error of a proportion should be $\sqrt{\frac{p*(1-p)}{n}}$, where p is the sample proportion (in this article, it's the percentage of stocks above their N-day moving average among the top 100 stocks), where n is the sample size (in this article, it's the number of stocks included in the top 100 stocks).

Based on the data from the three Asian markets, the result shows that the standard error of N-day DI incurred when using top 100 stocks as the sample instead of all stocks in the market is in the range of 2% to 7%. That is to say, the range outside the DI value (using only top 100 stocks) should contain 70% of the possible values using all stocks. Moreover, since all market internal gauge in this article will apply further smoothing by a N-day moving average, such smoothing process should further reduce the statistic error significantly. **Hence calculating the market internal gauge using the sample from top 100 stocks should not introduce statistic error of any significance.**

Issue 2: Survivorship Bias

In this article, stocks included in calculating the market internal gauge are all currently traded issues. Due to limited resources, dead issues (stocks that have been de-listed due to bankruptcy, privatization, merger and acquisition, etc.) are not included as they should have been in a thorough investigation. This has introduced statistical bias towards the existing issues, all of which are survivors. How does this survivorship bias affect the research result in this article, and how significant is the effect?

Let's review the formula of N-day DI,

$$\text{N-day DI} = \frac{\textit{Number of stocks above their own N – day moving average}}{\textit{total number of stock in the group under study}} \text{ x } 100\%$$

Let P be the number of stocks above their own N-day moving average, T be the number of stocks in the sample, the formula can be re-written as this: N-day DI = $\frac{P}{T}$ x 100%.

If dead stocks were included in the calculation, the true N-day DI would be $\frac{P+D'}{T+D}$ x 100%, where D is the number of dead issues with market cap large enough to be included in the top 100 stocks at that time in history, and D' is the number of dead issues above their own N-day moving average among D. Statistically, the ratio $\frac{D'}{D}$ itself is subject to the value defined by $\frac{P}{T}$ at that time with a small standard error (discussed in Issue 1: statistic error). Thus, the true N-day DI, which is $\frac{P+D'}{T+D}$ x 100%, should not be significantly different from the DI derived by $\frac{P}{T}$ x 100%. However, during a bear market trough the true DI, which includes dead stocks in calculation, could be slightly lower than the DI, which only includes survivors in calculation. This is because most of the de-listed stocks perform much weaker than the survivors in a bear market, especially during a bear market trough. Hence, the survivorship bias does result in a value of DI slightly higher than the true DI at the time. However, when they are smoothed by a moving average, the effect from such bias will be further reduced from an already low level. **Thus, survivorship bias does not affect the testing result in this article of any significance.**

CONCLUSION

With sufficient evidence, logical reasoning and statistically significant testing results, this article has demonstrated that market internal indicators, such as the N-day DI and N-day DVI, are effective tools for stock market analysis, both in timing the short- to intermediate-term trend reversals as well as in gauging long-term investment sentiment.

BIBLIOGRAPHY

- Le Bon, Gustave. (1982, second edition). *The Crowd: A Study of the Popular Mind*. Atlanta, GA: Cherokee.
- Pring, J. Martin. (1991, third edition). *Technical Analysis Explained*. McGraw-Hill, Inc.
- Neill, B. Humphrey. (1992, fifth and enlarged edition). *The Art of Contrary Thinking*. Caldwell: The Caxton Printers, Ltd.
- Plummer, Tony. (1993, revised edition). *The Psychology of Technical Analysis*. Cambridge: Probus Publishing Company
- Sperandeo, Victor. (1994). *Trader Vic II - Principles of Professional Speculation*. New York: Wiley Finance Edition, John Wiley & Sons, Inc.
- Shefrin, Hersh. (2000). *Beyond Greed and Fear*. Boston: Harvard Business School Press
- Chen, Ted. (2001). Market Internal Analysis for Asian Markets. [Compiled from speakers' notes, IFTA 2001 Tokyo Conference]

(See over)

APPENDIX
DIMA SYSTEM RESULTS FROM 8 ASIAN MARKETS

Market	Trading instrument	System	# of trades (1)	% of winning trades (2)	Average win/loss ratio (3)	Total win expectation
1992 - 2002						(1)x(2)x(3)
Japan	TOPIX	DIMA	29	41.2%	1.42	16.97
		MA	*15*	*46.7%*	*1.88*	*13.17*
Singapore	ST Index	DIMA	24	54.2%	2.79	36.29
		MA	*18*	*50.0%*	*1.52*	*13.68*
Taiwan	TWSE Weighted	DIMA	28	42.8%	1.43	17.14
		MA	*16*	*50.0%*	*1.54*	*12.32*
Malaysia	KLSE Composite	DIMA	26	65.4%	1.99	33.84
		MA	*15*	*53.3%*	*2.72*	*21.75*
Indonesia	JKSE All-share	DIMA	25	48.0%	0.83	9.96
		MA	*22*	*36.4%*	*0.96*	*7.69*
Philippines	PSE Composite	DIMA	23	73.9%	2.18	37.05
		MA	*14*	*64.3%*	*0.8*	*7.20*
India	BSE 30	DIMA	21	57.1%	1.57	18.83
		MA	*10*	*40.0%*	*1.53*	*6.12*
Pakistan	KSE All-share	DIMA	21	47.6%	2.63	26.29
		MA	*21*	*42.9%*	*1.65*	*14.86*
Average	N.A.	**DIMA**	**24.6**	**53.8%**	**1.86**	**24.55**
		MA	***16.4***	***48.0%***	***1.58***	***12.10***

Using Japanese Candlestick Reversal Patterns in the Arab and Mediterranean Developing Markets

Ayman Ahmed Waked

The Japanese candlestick is considered the oldest among all technical analysis methods. The technique may be divided into two parts: reversal patterns and continuation patterns. This article is concerned with the accuracy and importance of candlesticks reversal patterns in the Arab and Mediterranean developing markets and whether these patterns, which have been used in the primary western markets for many years, have at least as much relevance in those markets.

This article covers the Japanese candlestick reversal patterns in three different ways:

- The number of appearances each has recorded during a specified time period;
- Patterns that prove to be of high statistical significance; and
- The average move which follows each pattern, taking into consideration the average time duration for this move.

Examples will be given for the Turkish, Egyptian, Israeli, Jordanian and Cypriot markets as either an individual share or a market index. However, the statistical analysis will only be made on market indices for Turkey, Egypt and Israel.

The three indices, which have been analysed, are:

- **The ISE National-100**, which is a composite of the Turkish national market companies. The ISE National-100 contains the ISE National-50 and 30 companies and the Hermes Financial Index which is a broad-based index covering the most actively traded stocks on the Cairo and Alexandria stock exchanges;
- **The Hermes Financial Index**, which is the benchmark for the Egyptian market and is used to monitor the overall market performance;
- **The Tel Aviv 100 Index**, a capitalization-weighted index, which comprises the largest 100 Tel Aviv stock exchange listed shares.

The statistical analysis goes back to early 1997 from July 2002. It is important to mention that the primary trend has shifted in these markets during the period under study and that all of the analysis is based on the daily chart.

The candlestick reversal patterns consist of a single candle or a combination of more than one candle. These patterns alert that the trend may change. The study begins by examining single candle reversal patterns represented by the Hanging Man, Shooting Star, Hammer, Inverted Hammer and Bullish and Bearish Belt Hold Lines. We then examine the duel candle reversal patterns represented by the Bullish Engulfing Pattern, Bearish Engulfing Pattern, Dark Cloud Cover and Piercing Pattern.

Single Reversal Patterns

Chart 1: The Hanging Man

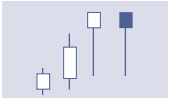
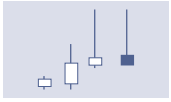


Chart 2: The Shooting Star



As shown in Chart 1 the Hanging Man is a top reversal pattern with a long lower Shadow and a small Real Body at the upper range of the day, while the Shooting Star in Chart 2 has a long upper Shadow and a small Real Body at the lower end of the day. It is a top reversal pattern. The colour of the real body is not of major importance in both patterns.

Chart 3: Eastern Tobacco (EAST.CA)

Chart 3 Eastern Tobacco (EAST.CA) clearly shows how the trend sharply reversed after the appearance of the Shooting Star pattern in January 2000.

Chart 4 Tel Aviv 100 (TA100)

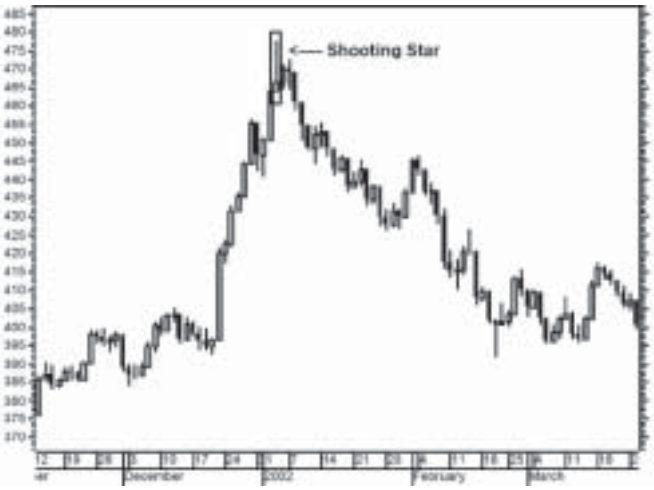


Chart 4 Tel Aviv 100 (TA100) is a good example of how the Shooting Star is very significant in the Israeli market as the index sharply declined after the occurrence of the pattern.

Chart 5 ISE National-IOO

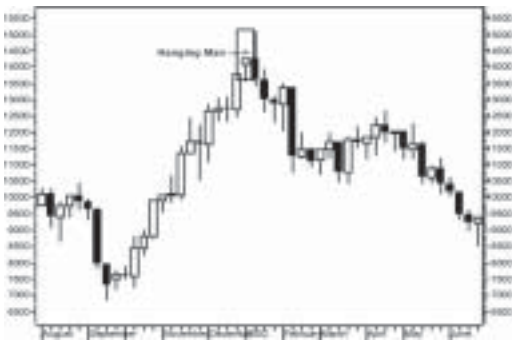
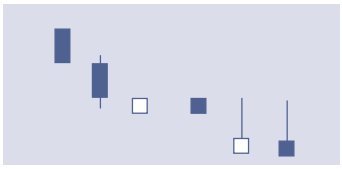


Chart 5 ISE National-I00 shows how the Hanging Man in January 2002 ended the strong rally and suggested a peak in the Turkish market.

Chart 6: Hammer and the Inverted Hammer



The Hammer and the Inverted Hammer illustrated in Chart 6 are the opposite of the Shooting Star and Hanging Man. They are bottom reversal patterns that take place at the end of a downtrend. Both patterns suggest that demand is gaining control of the market and the trend is about to change direction. The Hammer is made-up of a long lower Shadow with a small Real Body at the upper range of the day, while the Inverted Hammer is built of a long upper Shadow with a small Real Body at the lower end of the day. Like the Hanging Man and Shooting Star the colour of the real body is not really important in analyzing both patterns.

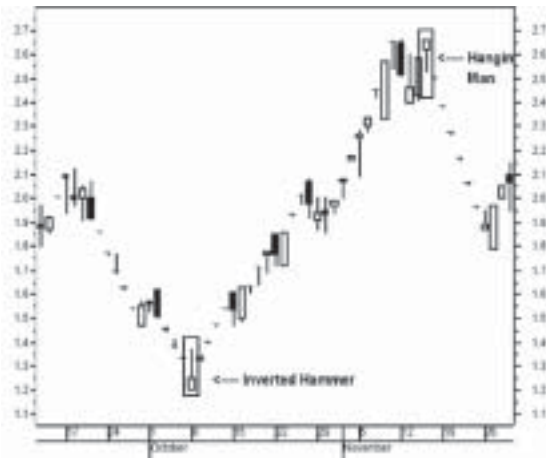
Chart 7: ISE National-100 (.XU100)

Chart 7 shows another good example of how candlestick reversal patterns are quite effective in changing trends in the Arab and Mediterranean developing markets. It is clear how Hammer 1, in September 2001, changed the trend from negative to neutral before the bull trend was confirmed weeks later. Hammer 2 in the same example shows how the bulls were able to regain control after a short correction to continue the positive trend started by Hammer 1.

Chart 8: Cyprus SE Hotel/tourism IDX (.CHTR)

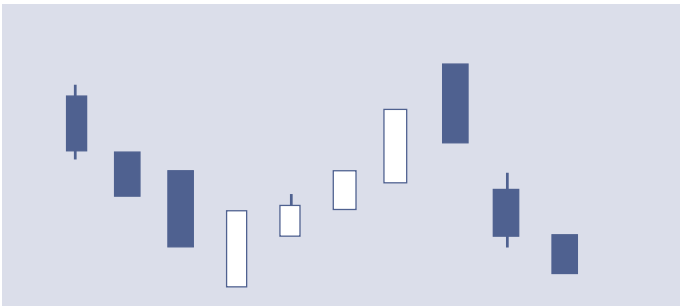
Chart 8 shows how the sell off in Cyprus SE Hotels/Tourism IDX, which began in June 2001, was reversed during September by the appearance of the Hammer. The importance of the Hammer's lower shadow was reflected eight months after the emergence of the pattern as the bears failed to maintain new lows in the index.

Chart 9: Arab Contractors (AICR.CA)



The daily chart for Arab Contractors, in Chart 9, is a good example of how the Inverted Hammer in October 2001 suggested a bottom in the stock and the beginning of a sharp advance that was also terminated by the occurrence of the Hanging Man in late November. This pattern appears in limited numbers in these markets.

Chart 10: Bullish and Bearish Belt Hold Lines



The Bullish Belt Hold Line has a long white candle that opens near the lows of the day and then the market reverses to close near the highs, this pattern is also called the Shaven Bottom. The Bearish Belt Hold Line has a long black Real Body that opens at the high and closes near the low of the day. This pattern is also called Shaven Head.

Chart 11: Tel Aviv 100

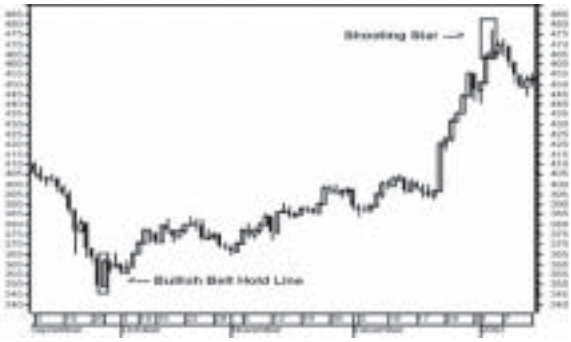


Chart 11 Tel Aviv 100 clearly shows how the appearance of the bullish belt hold line signalled the beginning of the bull trend that remained for several weeks before it was ended by the shooting star.

Chart 12: Egyptian Company Mobile Services (EMOB.CA)

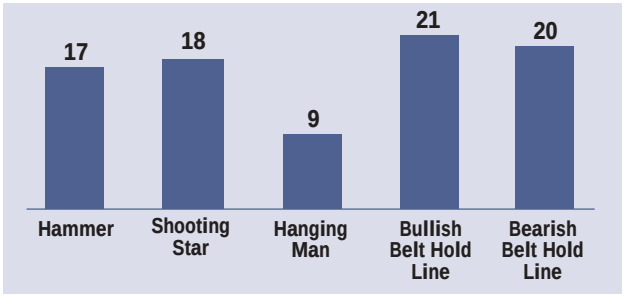
Chart 12 is a good example of how the Bearish Belt Hold Line signalled a top in the most active stock in Egyptian market.

STATISTICAL ANALYSIS OF SINGLE REVERSAL PATTERNS

Hermes Financial Index (Egypt)

The statistical analysis covers the Hammer, Shooting Star, Hanging Man and Bullish and Bearish Belt Hold Lines. The Inverted Hammer has been excluded due to the very limited number of appearances. The five patterns appeared 85 times in the Hermes Financial Index during the period from May 1997 until July 2002.

Chart 13: The Number of Appearances of Each Pattern in the Hermes Financial Index



Individually, the Hammer appeared 17 times. In 65% of the cases the pattern was successful in reversing the trend and the index rose in the following days. On average the index was 8.60% higher after this pattern in an average time of 9 days. The Hammer proved to be of high statistical significance.

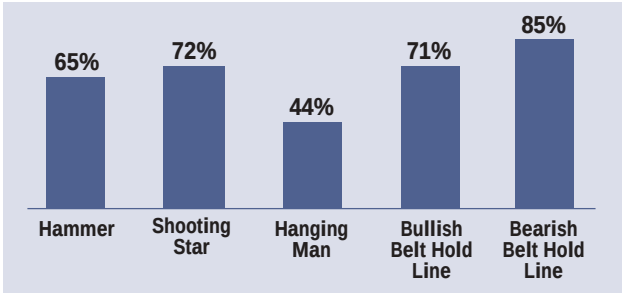
The Shooting Star occurred 18 times during the period under study. In 72% of the cases the pattern was significant as it indicated the change in direction correctly and the index fell in the following days. On average the index lost around 4.55% after this pattern in an average time of8 days. The Shooting Star proved to be of very high statistical significance.

The Hanging Man had the lowest number of appearances of all single reversal patterns in the Hermes Index, as it appeared only 9 times. In only 4 cases (44%) the index fell in the following days, while in 56% of the cases it continued to move higher. The Hanging Man proved to be of very low statistical significance for the Hermes Index. On average the index dropped 1.70% in an average time of 5 days.

The Hermes Financial Index exhibited the Bullish Belt Hold Line 21 times during the period under examination. In 71% of the cases the index increased in the following days. On average the index gained 7.50% after this pattern, in an average time of 7 days. This pattern also proved to be of high statistical significance.

The Bearish Belt Hold Line appeared 20 times; in 85% of the cases it correctly indicated the market direction and the index fell in the following days. On average the index lost 7% after this pattern in an average time of 10 days. The Bearish Belt Hold Line proved to be of high statistical significance (see Charts 13 and 14).

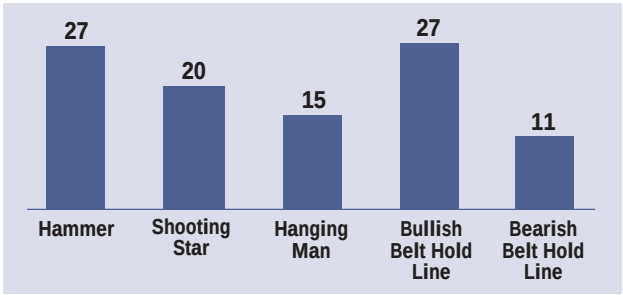
Chart 14: Percentage of Success for Each Pattern in Hermes Index



ISE National-100 (Turkey)

The statistical analysis made on the ISE National-100 covered five single reversal patterns: the Hammer, Shooting Star, Hanging Man, Bullish and Bearish Belt Hold Lines. The Inverted Hammer was not included due to the very limited number of appearances. During the period from January 1997 to July 2002 the five patterns appeared 100 times in the ISE National-100 daily chart.

Chart 15: The Number of Appearance of Each Pattern in ISE National-100



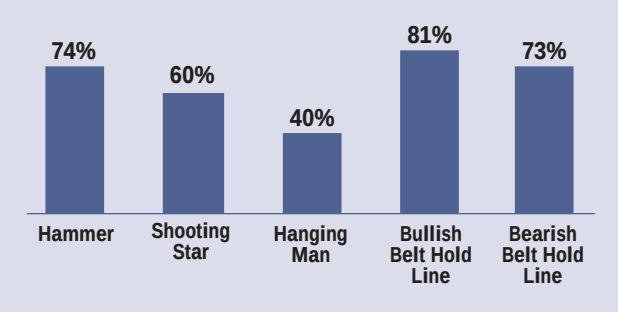
Looking at each of these patterns individually, the Hammer appeared 27 times during the period under inspection. In 74% of the cases the ISE National-100 was higher in the following days. On average the index was 17% higher after this pattern in an average time of 8 days. This pattern had a very high statistical significance.

The Shooting Star appeared 20 times. On average the index lost 12% after this pattern in an average time of 7 days. In 60% of the cases the index fell in the following days. The Hanging Man occurred 15 times. In only 40% of the cases did it indicate the direction correctly. On average the index dropped by 9% in an average time of 5 days. This pattern proved to be of very low statistical significance.

The Bullish Belt Hold Line proved to be of very high statistical signifi-

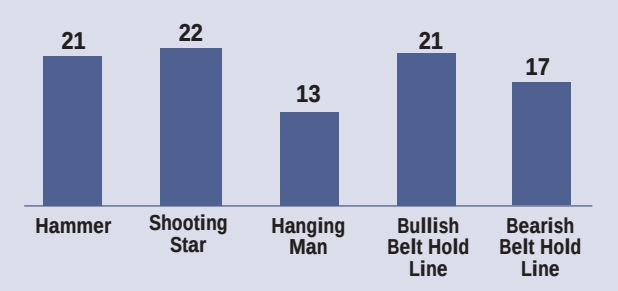
cance with a hit ratio of 81 %. On average the index was 13% higher in an average time of 6 days, while the Bearish Belt Hold Line appeared 11 times. In 73% of the cases the pattern indicated the market direction correctly and the index dropped the following days. On average the index lost 10% after this pattern in an average 4 days time (Charts 15 and 16).

Chart 16: Percentage of Success for Each Pattern in ISE National-100



Tel Aviv 100 (Israel)

Chart 17: The Number of Appearance of Each Pattern in Tel Aviv 100



The analysis on the Tel Aviv 100 covered five single reversal patterns: Hammer, Shooting Star, Hanging Man, Bullish and Bearish Belt Hold Lines. Once again, the Inverted Hammer was not included due to the limited number of appearances. During the period from January 1997 to July 2002 these patterns appeared 94 times in the Tel Aviv 100.

The Hammer appeared 21 times during the period under inspection. In around 72% of the cases the index rose in the following days. On average the index rose 4.50% after this pattern in an average time of 6 days. The Hammer proved to be of very high statistical significance in the Tel Aviv 100.

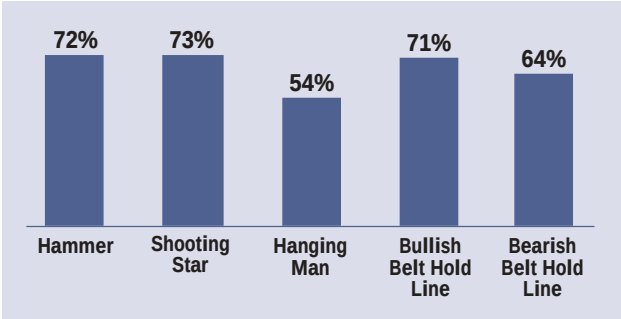
The Shooting Star appeared 22 times during the period under study. In 73% of the cases the index declined in the following days and indicated the direction correctly. On average the index lost 4% following this pattern in an average time of 5 days. This pattern also proved to be of very high statistical significance in the Israeli market.

The Hanging Man had the lowest number of appearances of all single reversal patterns covered by the analysis, as it only appeared 13 times. In 54% of the cases the pattern was successful in reversing the trend and the index was lower in the following sessions. On average the index lost 4.75% after the appearance of the Hanging Man in an average time of 4 days.

The Bullish Belt Hold Line appeared 21 times. This single reversal pattern proved to be of very high statistical significance - similar to the Hammer and the Shooting Star. In 71% of the cases the Tel Aviv 100 rose in the following days. On average the index rose 5.25% after this pattern in an average time of 11 days.

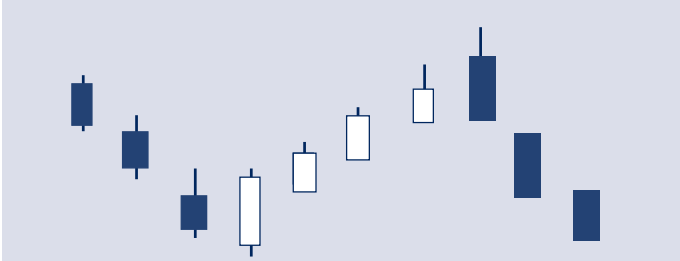
The Tel Aviv 100 exhibited the Bearish Belt Hold Line 17 times during the period under examination. In 64% of the cases the index was lower in the following days. On average the index was 3.85% lower after the occurrence of this pattern in an average time of 6 days. This pattern is considered of high statistical significance (Charts 17 and 18).

Chart 18: Percentage of Success for Each Pattern in Tel Aviv 100



DUEL REVERSING PATTERNS

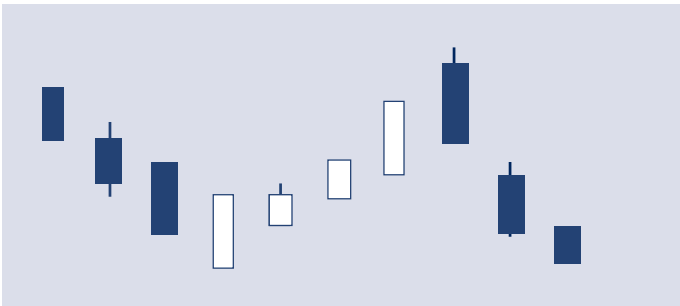
Chart 19: Bullish and Bearish Engulfing Patterns



The second types of reversal patterns covered are the dual reversal patterns, which are represented by the Bullish Engulfing Pattern, Bearish Engulfing Pattern, Dark Cloud Cover and the Piercing Pattern.

The Engulfing patterns are considered major reversal patterns. The Bullish Engulfing pattern is a bottom reversal pattern that consists of two candles - a relatively small Real Body that is followed by a long white candle. The candle opens below the first days close and closes above its open. The opposite occurs with the Bearish Engulfing Pattern. It is considered a top reversal pattern. It is made-up of a relatively small white candle that is followed by a long black candle. The second day should open above the first day close and close below its open. The upper and lower shadows are not taken into account while analyzing both patterns (Chart 19).

Chart 20: Piercing Pattern and Dark Cloud Cover



The Dark Cloud Cover is a top reversal pattern that consists of two candles. The first day is a long white candle while the second day opens above the pervious close and closes within its real body, the more the penetration into the first day's real body, the stronger the signal. The opposite is true for the piercing pattern. It is a bottom reversal pattern. The first day is a long black candle followed by a white candle, which also closes within the first candle real body. Both patterns suggest a shifting in the trend direction (Chart 20).

Chart 21: Arab Polivara Spinning and Weaving (APSW.CA)

Chart 22 Amman General Index (.AMMAN)

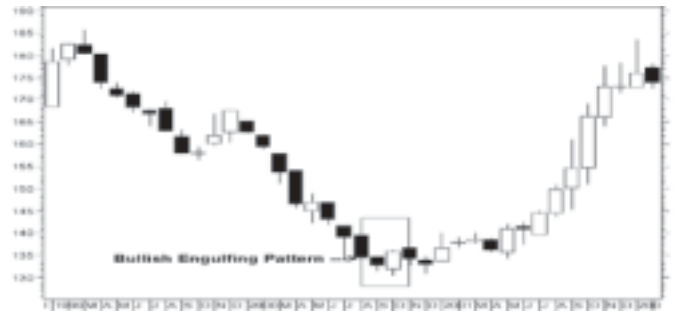


Chart 22 shows that the major buy signal in Amman General Index was from the bullish engulfing pattern.

Chart 23: Hermes Financial Index (.HRMS)

Chart 23 shows how Hermes Financial Index declined after the appearance of the Bearish Engulfing Pattern during October 1999.

Chart 24: Finansbank (FINBN.IS)

Chart 24: FINANSBANK (FINBN.IS)

Chart 24 clearly shows how the appearance of the dark cloud cover ended the two rallies in the Turkish FINANSBANK.

Chart 25: Commercial International Bank (COMLCA)

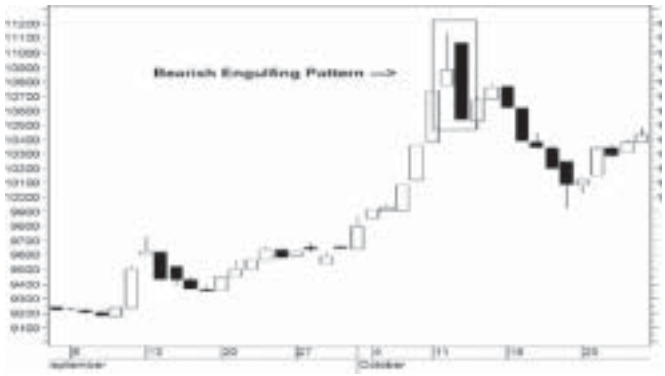
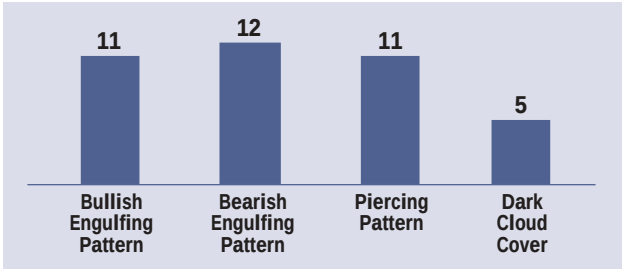


Chart 25 illustrates how the Commercial International Bank sharply rallied after the appearance of the weekly piercing pattern.

Statistical Analysis of the Dual Reversal Patterns in the Hermes Financial Index

The statistical analysis of reversal patterns with two candles covered the Bullish Engulfing Pattern, Bearish Engulfing Pattern, Piercing Pattern and Dark Cloud Cover. The analysis focused on the Hermes Financial Index during the period from May 1997 till July 2002. The four patterns appeared 39 times.

Chart 26: The Number of Appearance of Each Pattern in Hermes Financial Index



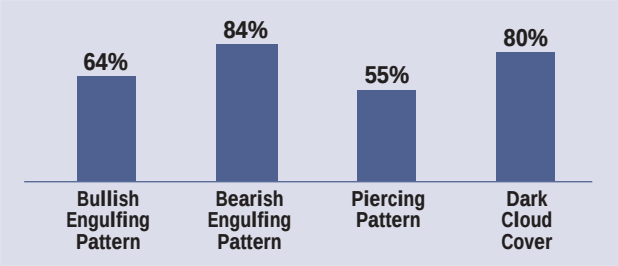
Individually, the Bearish Engulfing Pattern appeared 12 times. In 84% of the cases the Hermes Financial Index fell in the following days. On average, the index lost 5.60% after the appearance of the Bearish Engulfing Pattern, in an average time of 9 days. The Bearish Engulfing Pattern proved to be of very high statistical significance.

The Bullish Engulfing Pattern appeared 11 times. On average the index increased 2.83% in an average time of 4 days. In 64% of the cases the pattern indicated the correct market direction and the index was higher the following days.

The Piercing Pattern appeared 11 times during the period under study. In 55% of the cases the pattern correctly indicated the direction and the index was higher in the following days. On average the index rose 7% after this pattern in an average time of 6 days.

The Dark Cloud Cover appeared 5 times during the same period. On average the index rose 1.43% after the pattern in an average time of 4 days. In 80% of the cases the index was lower the following days (Charts 26 and 27).

Chart 27: Percentage of Success for Each Pattern in Hermes Index



CONCLUSION

The statistical analysis in this article has shown that: the candlestick reversal patterns appear regularly and proved to be very effective, reliable and of crucial importance in predicting trend reversals in the Arab and Mediterranean developing markets.

The Inverted Hammer had a very limited number of appearances in the three markets, it occurred as a sideways pattern in most of the cases.

The statistical significance of the Hanging Man was very low in three markets, with an average hit ratio 46% of the three markets.

The statistical significance of the bearish reversal patterns was higher than the bullish patterns in the Egyptian market, while the opposite occurred in the Turkish and Israeli Markets.

BIBLIOGRAPHY

- *Nison, Steve, Japanese Candlestick Charting Techniques*
- *Nison Steve, Beyond Candlesticks*
- *NTAA, Analysis of Stock Prices in Japan*

Derivation of Buying and Selling Signals Based on the Analyses of Trend Changes and Future Price Ranges

Shiro Yamada

INTRODUCTION

Moving averages and other technical analysis indicators have been used for evaluating trend changes in prices. The most popular indicator, the moving average line, has been developed into a variety of applied techniques, including the computation of spread ratios, the utilization of golden and dead crosses, etc.

Since the moving average lines indicate averages of past prices, they tend to lag daily price fluctuations. If their computational period is set to a long term, they are useful as a guide for support or resistance, but timing for recognizing trend changes tends to be much later than the actual price movements. If the period is set to a short one, they become more sensitive to trend changes, but the use for trading signals increases the frequency of occurrences of so-ca1led "misleading signals."

Efforts have been made, in many ways, to avoid such "misleading signals". For example, one may combine the use of momentum-type technical indicators with moving averages. In this article I intend to show how to enhance the reliability of signals indicating trend changes by regulating future price ranges based on probability theory. In other words, I will show some techniques to remove such "misleading signals" at an early stage.

To attain this goal, I will define trading signals with specific rules and verify their effects by applying actual trades.

ESTIMATION OF FUTURE PRICE RANGES

In the field of market risk management, there have been some techniques that measure volatility out of the distribution of price fluctuations in the nearest cycle and estimate future price ranges (or degrees of risk). One of them is the VaR (Value at Risk) analysis, which is known as a price fluctuation risk-measuring technique.

The estimation of price ranges by using such data usually comes from numerals that are found by means of probability and are independent of price trends. Therefore, if the probability distribution and the estimation period are appropriately selected, it is highly probable that future prices will fall within the estimated price range. (Normally, however, this will not clarify whether the estimated future prices are ranked above or below those prevailing at the time of such estimation.)

Such being the case, this article is based on the fact that the reliability of signals which indicate trend changes will be, possibly, improved if we pay due attention to future price ranges that are estimated by probability.

Generally speaking, assuming that the price W at the time t is changed into W + ΔW at a future time T and that the changed price Δ W follows the function of probability density f (ΔW), then the value X_1 that satisfies

$$\int_{-\infty}^{-X_1} f(\Delta W)d\Delta W = \alpha$$

is defined as VAR (maximum estimated loss) for a long position at the level of 100 (1 -α)%. (Namely, ΔW falls within the VAR at the probability of 100 (1 -α)%).

A price that is lower by VAR (= X_1) than the present price W is regarded as the lower limit of an estimated price range in the future time T.

In the same manner, the price VAR for a short position is the value X_h that satisfies

$$\int_{Xh}^{\infty} f(\Delta W)d\Delta W = \alpha$$

A price that is higher by VAR (=X_h) than the present price W is regarded as the upper limit of an estimated price range in the future time T.

Assuming that the rate of return of a subject asset conforms to normal distribution N (μ, σ^2) in the calculation of X_1 and Xη as generally done in many cases, VAR is easily found as follows:

$VAR=W(1-e^{\mu-z(\alpha)\sigma})$

where, μ: average of the rate of return;

σ: standard deviation of the rate of return;

z (α): percentile in standard normal distribution.

By applying the results thus found, the following can be computed.

Estimated lower limit value = W – X_1

Estimated upper limit value = W + X_h

The widths of estimated price ranges vary in accordance with the selection of estimation period (T – t) and α (namely, assuming that the said VAR is based on daily data, the width of the range is √ y times if the estimation period is y days). It is expected that, if these values are appropriately selected, price fluctuations will fall within an estimated range at a considerably high probability.

As stated above, however, this is equal to mere computation of an estimated range above and below the current price in ordinary cases and does not indicate any directions of the price fluctuations.

The objective of this computation is to help in using an indicator that suggests trend changes. (In other words, the estimation of the range is not the final objective).

The application of this estimation of future price ranges and concrete presumptions for computing values will be discussed in subsequent sections together with simulations using actual market data.

TRADING SIMULATIONS

In this section, I will attempt to apply the future price range estimation described in the previous section by combining it with indicators for trend changes.

First of all, let's simulate a trading system in which selling and buying signals come from the golden cross and dead cross based on a couple of moving average lines, long and short.

Since this is not a simulation in which the application of the moving average lines is focused, we adopt a buying signal simply when a short-term line moves above a long-term one and a selling one when the former moves below the latter. Other factors are defined as follows:

- Assume the two combinations (short-term: 5 days, long-term: 25 days) and (short-term 25 days, long-term75 days);
- Measure profits and losses to be generated for the period from the beginning of 1989 to the end of July 2002;
- Always hold positions (Even up a position held whenever a sign is produced and open interest on an opposite side);
- Subject assets: 2 types, namely, Japanese stocks (Nikkei Stock Average of 225 selected issues) and US stocks (Dow-Jones Industrial Average);
- Unit of opening interest: Stock price index concerned x 1.

The simulation results are given in the upper portions of Tables 1 to 4.

Table 1

Trading system under identification of trend changes (Nikkei 225)

Short term: 5-day MA, Long term: 25-day MA

	No. of trading	Success	Failure	Success r	Profit	(Max. profit)	Loss	(Max. loss)	Total of profit and loss
1989	7	3	4	42.9%	1,839	(981)	−1,815	(−789)	24
1990	14	6	8	42.9%	19,706	(7,342)	−5,946	(−1,756)	13,760
1991	11	4	7	36.4%	7,512	(2,849)	−4,625	(−1,112)	2,887
1992	11	5	6	45.5%	6,094	(2,473)	−5,241	(−1,318)	853
1993	10	3	7	30.0%	5,157	(2,553)	−2,834	(−1,013)	2,323
1994	22	6	16	27.3%	3,114	(1,617)	−5,180	(−855)	−2,066
1995	12	4	8	33.3%	4,267	(2,813)	−3,201	(−909)	1,065
1996	17	5	12	29.4%	4,021	(2,204)	−4,746	(−823)	−726
1997	10	3	7	30.0%	7,268	(3,052)	−2,504	(−601)	4,764
1998	10	4	6	40.0%	3,395	(1,903)	−2,036	(−445)	1,358
1999	19	7	12	36.8%	2,610	(1,515)	−4,222	(−685)	−1,612
2000	13	4	9	30.8%	4,222	(1,993)	−4,931	(−978)	−709
2001	10	6	4	60.0%	3,787	(1,554)	−1,333	(−704)	2,455
2002	6	2	4	33.3%	1,051	(992)	−1,563	(−670)	−512
Total	172	62	110	36.0%	74,042	(7,342)	−50,177	(−1,756)	23,865

Trading system under identification of trend changes and analysis of future price ranges (Nikkei 225)

Short term: 5-day MA, Long term: 25-day MA, Estimation period: 5 days

	No. of trading	Success	Failure	Success ratio	Profit	(Max. profit)	Loss	(Max. loss)	Total of profit and loss
1989	8	3	5	37.5%	3,729	(2,450)	−2,137	(−789)	1,592
1990	13	6	7	46.2%	19,210	(8,063)	−4,401	(−1,756)	14,810
1991	11	5	6	45.5%	7,901	(2,849)	−3,861	(−1,112)	4,040
1992	12	5	7	41.7%	6,274	(2,473)	−4,101	(−1,362)	2,172
1993	10	3	7	30.0%	4,671	(2,553)	−3,181	(−870)	1,491
1994	21	7	14	33.3%	3,623	(1,656)	−4,506	(−855)	−883
1995	12	6	6	50.0%	4,588	(2,651)	−3,022	(−909)	1,566
1996	17	5	12	29.4%	4,415	(2,204)	−4,055	(−528)	359
1997	10	4	6	40.0%	7,185	(3,037)	−2,419	(−682)	4,765
1998	10	4	6	40.0%	3,248	(1,903)	−2,243	(−721)	1,005
1999	19	7	12	36.8%	2,168	(666)	−3,704	(−685)	−1,536
2000	13	5	8	38.5%	4,001	(1,835)	−4,143	(−870)	−142
2001	10	5	5	50.0%	3,200	(1,554)	−1,469	(−704)	1,731
2002	6	2	4	33.3%	1,558	(1,484)	−1,455	(−670)	103
Total	172	67	105	39.0%	75,772	(8,063)	−44,697	(−1,756)	31,075

Table 2

Trading system under identification of trend changes (Nikkei 225)

Short term: 25-day MA, Long term: 75-day MA

	No. of trading	Success	Failure	Success r	Profit	(Max. profit)	Loss	(Max. loss)	Total of profit and loss
1989	1	0	1	0.0%	0	(0)	-1,105	(-1,105)	-1,105
1990	3	2	1	66.7%	3,796	(2,853)	-5,257	(-5,257)	-1,461
1991	6	3	3	50.0%	5,911	(4,579)	-5,643	(-2,681)	268
1992	3	1	2	33.3%	3,532	(3,532)	-4,249	(-2,806)	-717
1993	7	2	5	28.6%	1,796	(1,719)	-4,423	(-1,225)	-2,627
1994	2	1	1	50.0%	450	(450)	-167	(-167)	282
1995	3	2	1	66.7%	6,646	(4,387)	-174	(-174)	6,471
1996	5	2	3	40.0%	2,695	(2,436)	-1,073	(-450)	1,622
1997	2	1	1	50.0%	263	(263)	-751	(-751)	-488
1998	5	1	4	20.0%	2,148	(2,148)	-4,813	(-1,938)	-2,665
1999	6	1	5	16.7%	2,050	(2,050)	-5,192	(-1,748)	-3,142
2000	1	1	0	100.0%	126	(126)	0	(0)	126
2001	3	2	1	66.7%	7,028	(4,838)	-575	(-575)	6,453
2002	3	0	3	0.0%	0	(0)	-3,252	(-1,323)	-3,252
Total	50	19	31	38.0%	36,441	(4,838)	-36,676	(-5,257)	-235

Trading system under identification of trend changes and analysis of future price ranges (Nikkei 225)

Short term: 25-day MA, Long term: 75-day MA, Estimation period: 5 days

	No. of trading	Success	Failure	Success r	Profit	(Max. profit)	Loss	(Max. loss)	Total of profit and loss
1989	2	0	2	0.0%	0	(0)	-405	(-212)	-405
1990	3	2	1	66.7%	8,831	(4,817)	-565	(-565)	8,267
1991	5	3	2	60.0%	2,664	(1,939)	-872	(-438)	1,792
1992	3	0	3	0.0%	0	(0)	-3,880	(-1,500)	-3,880
1993	7	2	5	28.6%	1,951	(1,874)	-3,226	(-869)	-1,275
1994	3	2	1	66.7%	2,263	(1,642)	-1,223	(-1,223)	1,040
1995	2	1	1	50.0%	1,639	(1,639)	-174	(-174)	1,465
1996	5	2	3	40.0%	1,560	(1,301)	-893	(-522)	667
1997	3	2	1	66.7%	4,489	(2,787)	-79	(-79)	4,410
1998	5	0	5	0.0%	0	(0)	-2,677	(-1,009)	-2,677
1999	6	2	4	33.3%	972	(749)	-3,366	(-1,448)	-2,394
2000	1	1	0	100.0%	1,302	(1,302)	0	(0)	1,302
2001	3	2	1	66.7%	318	(201)	-447	(-447)	-130
2002	2	2	0	100.0%	177	(127)	0	(0)	177
Total	50	21	29	42.0%	26,166	(4,817)	-17,807	(-1,500)	8,359

Table 3

Trading system under identification of trend changes (DJI)

Short term: 5-day MA, Long term: 25-day MA

	No. of trading	Success	Failure	Success r	Profit	(Max. profit)	Loss	(Max. loss)	Total of profit and loss
1989	12	3	9	25.0%	375	(175)	-562	(-116)	-187
1990	13	4	9	30.8%	604	(403)	-507	(-84)	97
1991	22	3	19	13.6%	271	(243)	-1,059	(-122)	-788
1992	18	3	15	16.7%	347	(296)	-990	(-125)	-643
1993	14	4	10	28.6%	167	(107)	-393	(-85)	-226
1994	12	6	6	50.0%	522	(298)	-440	(-104)	82
1995	9	4	5	44.4%	1,134	(732)	-357	(-102)	777
1996	15	4	11	26.7%	946	(554)	-1,402	(-218)	-455
1997	9	5	4	55.6%	1,676	(1,093)	-170	(-104)	1,506
1998	15	4	11	26.7%	3,192	(1,095)	-2,169	(-404)	1,022
1999	14	3	11	21.4%	1,725	(1,184)	-1,857	(-410)	-132
2000	18	4	14	22.2%	1,513	(944)	-4,582	(-558)	-3,070
2001	16	5	11	31.3%	2,974	(979)	-2,166	(-333)	807
2002	5	2	3	40.0%	570	(429)	-605	(-373)	-35
Total	192	54	138	28.1%	16,015	(1,184)	-17,260	(-558)	-1,245

Trading system under identification of trend changes and analysis of future price ranges (DJI)

Short term: 5-day MA, Long term: 25-day MA, Estimation period: 5 days

	No. of trading	Success	Failure	Success r	Profit	(Max. profit)	Loss	(Max. loss)	Total of profit and loss
1989	12	3	9	25.0%	407	(175)	-593	(-187)	-186
1990	13	5	8	38.5%	693	(403)	-415	(-66)	278
1991	22	4	18	18.2%	392	(293)	-832	(-124)	-440
1992	19	4	15	21.1%	366	(296)	-967	(-125)	-602
1993	14	4	10	28.6%	213	(72)	-348	(-85)	-134
1994	11	4	7	36.4%	236	(97)	-373	(-92)	-136
1995	9	4	5	44.4%	834	(403)	-345	(-102)	490
1996	15	4	11	26.7%	609	(283)	-1,388	(-218)	-779
1997	9	7	2	77.8%	1,299	(771)	-161	(-104)	1,139
1998	16	3	13	18.8%	2,690	(1,002)	-2,335	(-404)	355
1999	13	4	9	30.8%	632	(234)	-1,776	(-410)	-1,144
2000	18	5	13	27.8%	1,426	(687)	-4,433	(-554)	-3,007
2001	16	5	11	31.3%	3,198	(1,054)	-2,277	(-333)	920
2002	6	3	3	50.0%	1,778	(1,208)	-345	(-182)	1,433
Total	193	59	134	30.6%	14,773	(1,208)	-16,588	(-554)	-1,814

Table 4

Trading system under identification of trend changes (DJI)

Short term: 25-day MA, Long term: 75-day MA

	No. of trading	Success	Failure	Success r	Profit	(Max. profit)	Loss	(Max. loss)	Total of profit and loss
1989	1	0	1	0.0%	0	(0)	-172	(-172)	-172
1990	4	1	3	25.0%	32	(32)	-357	(-132)	-325
1991	1	1	0	100.0%	290	(290)	0	(0)	290
1992	3	2	1	66.7%	136	(120)	-304	(-304)	-168
1993	0	0	0	-	0	(0)	0	(0)	0
1994	5	1	4	20.0%	455	(455)	-265	(-120)	191
1995	1	0	1	0.0%	0	(0)	-256	(-256)	-256
1996	4	1	3	25.0%	1,584	(1,584)	-791	(-299)	792
1997	6	2	4	33.3%	1,131	(682)	-2,307	(-880)	-1,176
1998	6	1	5	16.7%	802	(802)	-2,067	(-668)	-1,266
1999	2	1	1	50.0%	1,329	(1,329)	-685	(-685)	643
2000	5	1	4	20.0%	51	(51)	-1,225	(-420)	-1,174
2001	5	1	4	20.0%	498	(498)	-2,451	(-886)	-1,953
2002	3	1	2	33.3%	9	(9)	-1,026	(-584)	-1,017
Total	46	13	33	28.3%	6,316	(1,584)	-11,907	(-886)	-5,591

Trading system under identification of trend changes and analysis of future price ranges (DJI)

Short term: 25-day MA, Long term: 75-day MA, Estimation period: 5 days

	No. of trading	Success	Failure	Success r	Profit	(Max. profit)	Loss	(Max. loss)	Total of profit and loss
1989	2	0	2	0.0%	0	(0)	-175	(-121)	-175
1990	3	1	2	33.3%	104	(104)	-70	(-38)	34
1991	2	0	2	0.0%	0	(0)	-157	(-123)	-157
1992	3	1	2	33.3%	27	(27)	-91	(-68)	-64
1993	0	0	0	-	0	(0)	0	(0)	0
1994	5	2	3	40.0%	62	(41)	-274	(-131)	-212
1995	1	0	1	0.0%	0	(0)	-65	(-65)	-65
1996	4	0	4	0.0%	0	(0)	-439	(-216)	-439
1997	5	1	4	20.0%	333	(333)	-2,502	(-934)	-2,169
1998	7	2	5	28.6%	1,047	(885)	-1,309	(-380)	-262
1999	1	0	1	0.0%	0	(0)	-349	(-349)	-349
2000	6	3	3	50.0%	533	(479)	-1,382	(-620)	-849
2001	5	1	4	20.0%	1,236	(1,236)	-1,067	(-633)	169
2002	3	1	2	33.3%	1,141	(1,141)	-1,026	(-584)	115
Total	47	12	35	25.5%	4,483	(1,236)	-8,906	(-934)	-4,423

I begin the simulation by adding new rules to include the estimation of future price ranges in the above assumptions. When selling and buying signals are generated, like the case with the first simulation above, I even up the trade immediately after the price moves adversely beyond an estimated range (in other words, when the price goes below the lower limit of the estimated range in the case of the long position or when it goes above the upper one in the case of short one.) In such a case, there is no position until either a golden cross or a dead cross generates a new selling or buying sign again. Other factors are defined as follows:

- α = 0.05 for determining the upper and lower limits of the estimated range (VAR of a 95% level);
- An estimation period (for the future): 5 days (for all of the simulations);
- Past data for estimation (computation of volatility): data of nearest 5 days.

The results of the additional simulation made under these conditions are indicated in the lower portions of Tables 1 to 4 so that they can be compared easily with the previous ones.

Figures 1-6, 2-6, 3-6 and 4-6 indicate changes of profits and losses accumulated for the whole periods.

Figure 1-6

Trading System Under Identification of Trend Changes and Analysis of Future Price Ranges (Nikkei 225)

Figure 2-6

Trading System Under Identification of Trend Changes and Analysis of Future Price Ranges (Nikkei 225)

Figure 3-6

Trading System Under Identification of Trend Changes and Analysis of Future Price Ranges (DJI)

Figure 4-6

Trading System Under Identification of Trend Changes and Analysis of Future Price Ranges (DJI)

VERIFICATION OF THE SIMULATION RESULTS

In the case of the Japanese stocks I increased profits since I adopted the selling/buying system in which future estimation ranges are considered, together with trial computations using signals obtained from the 5 to 25-day moving average lines and 25 to 75 moving average lines.

When reviewing the results year by year, most of the years produced higher profits than those based only on simple trend changes. When checking maximum losses in each year, I found that the profit and loss for the above-mentioned techniques made them more stable. The use of signals, in particular, for the 25 to 75-day moving average lines indicated apparent differences.

When checking profits and losses in each year more closely, it is found that the profits were not so much increased, but that the successful avoidance of losses made great contribution to the good results. This will demonstrate that the trading system adopted has devotedly met the objective to avoid "misleading signals."

It can be clearly stated that net profits have been more stably increased if the estimation of future price range is added as discussed in this article when compared with the trading backed merely by the simple identification of trend changes.

In the case of US stocks, on the other hand, profits accumulated by the selling/buying system based on the identification of trend changes throughout the same period were found negative, and it seems that this system did not functioned well.

When reviewing the pattern to which future price range analysis is added, the trial computation using signals under the 25 to 75-day moving average lines contributed to the reduction of losses, but this contribution was limited when compared with the same to the Japanese stocks. The trial computation using signals under the 5 to 25-day moving average lines resulted in negative effects, though an absolute value was small.

Particularly when reviewing the trial computations by year using the pattern of 5 to 25-day moving average lines, the negative functions of its effects attract special attention in the period from the middle to the latter half of 1990s in which stock prices hiked in the US, being rather characteristic when compared with other periods when its effects were found positive.

Qualitative analysis has suggested that the techniques for avoiding "misleading signals" gave reverse effects in upward markets (and often "overheated" ones) over a long term because such "misleading signals" rarely occur if viewed from a middle-to-long term perspective.

As seen in the contents of profits and losses in such cases, the fact is that the introduction of the technique under review has not increased losses (or more accurately, the amount of the losses have been rather reduced) and that earlier evening up has resulted in losing profits.

CONCLUSION AND FUTURE TASKS

As found in the verification in the preceding section, I have demonstrated the possibilities of increasing net profits by applying a technique to estimate future price range by means of a stochastic approach rather than by using a trading system simply backed by a traditional technique of trend analysis.

Hence, the main point of the article, namely, an 'earlier get -out from 'misleading factors'' has been considerably satisfied.

As the above verification has demonstrated, there appears a new task to cope with possible losses of chances to secure profits because the even-up procedure is taken earlier when a long-term trend occurs.

It is possible that the simulated system may have given influences in this respect because the process to identify trend changes was excessively simple. Since I emphasized the comparison with the case to which future price ranges are added, there may have been some room for displaying further ingenuity in devising a trading system in which moving average lines should be combined with positional relations with current prices, spread ratios, etc.

In the computation of future price ranges that forms the main theme of the present study, set values for estimation periods and data-obtaining ones as computation bases and other definitions may not cover all the phases of the price estimation. It is ideal that the technique suggested here should be further improved by adopting, for example, a simulation backed by short and long-term values.

More concretely, I proceeded with the present analysis using an orthodox assumption that the rate of return of a subject asset conforms to normal distribution simply because it is widely adopted thanks to ease in computation. I am now interested in assuming other complicated distributions depending on the types of assets and applying data-mining technique or Monte Carlo simulation to technical analysis.

An important point made in the article is that signals for starting risk-avoiding actions can be expressed by using quantitative indicators.

It is not rare that an investor may turn in losses due to erroneous reading of even-up timing, even after securing a lot of profits in a short period thanks to the utilization of a temporary trend.

In my opinion conventional mathematical market analyses (for example, quantitative analysis) and technical analyses will be more and more fused with each other in the present day when the developed computer technologies have enabled us to process huge amounts of data in a PC without any difficulty.

In the modern world of asset operation, moreover, the importance of 'risk management' has been repeatedly emphasized, and techniques involving financial engineering approaches backed exclusively by stochastic theories have been essential there.

I feel that such mathematical and logical analyses are consistent with technical analysis, and both are compatible with each other in terms of the requirement of enormous data processing stated above.

I feel that the analytical techniques employed here in this article are quite primitive when seen from such a viewpoint, but I intend to position them as an entrance leading to further development of approaches that will improve analytical techniques for contributing to better utilization of technical analysis.

Wyckoff Laws: A Market Test (Part A)

Henry Pruden, Ph.D., *Visiting Professor/Visiting Scholar*, and Benard Belletante, Ph.D., *Dean and Professor of Finance*, EuroMed-Marseille Ecole de Management, Marseille, France

The Wyckoff Method has withstood the test of time. Nonetheless, this article proposes to subject the Wyckoff Method to the further challenge of real-time-test under the natural laboratory conditions of the current U.S. Stock market. To set up this "test," three fundamental laws of the Wyckoff Method will be defined and applied.

Wyckoff is a name gaining celebrity status in the world of Technical Analysis and Trading. Richard D. Wyckoff, the man, worked in New York City during a "golden age" for technical analysis that existed during the early decades of the 20th Century. Wyckoff was a contemporary of Edwin Lefevré who wrote The Reminiscences of A Stock Operator. Like Lefevré, Wyckoff was a keen observer and reporter who codified the best practices of the celebrated stock and commodity operators of that era. The results of Richard Wyckoff's effort became known as the Wyckoff Method of Technical Analysis and Stock Speculation.

Wyckoff is a practical, straight forward bar chart and point-and-figure chart pattern recognition method that, since the founding of the Wyckoff and Associates educational enterprise in the early 1930s, has stood the test of time.

Around 1990, after ten years of trial-and-error with a variety of technical analysis systems and approaches, the Wyckoff Method became the mainstay of The Graduate Certificate in Technical Market Analysis at Golden Gate University in San Francisco, California, U.S.A. During the past decade dozens of Golden Gate graduates have gone to successfully apply the Wyckoff Method to futures, equities, fixed income and foreign exchange markets using a range of time frames. Then in 2002 Mr. David Penn, in a *Technical Analysis of Stocks and Commodities* magazine article named Richard D. Wyckoff one of the five "Titans of Technical Analysis." Finally, Wyckoff is prominent on the agenda of the International Federation of Technical Analysts (IFTA) for inclusion in the forthcoming Body of Knowledge if Technical Analysis.

The Wyckoff Method has withstood the test of time. Nonetheless, this article proposes to subject the Wyckoff Method to the further challenge of real-time-test under the natural laboratory conditions of the current U.S. Stock market. To set up this "test," three fundamental laws of the Wyckoff Method will be defined and applied.

THREE WYCKOFF LAWS

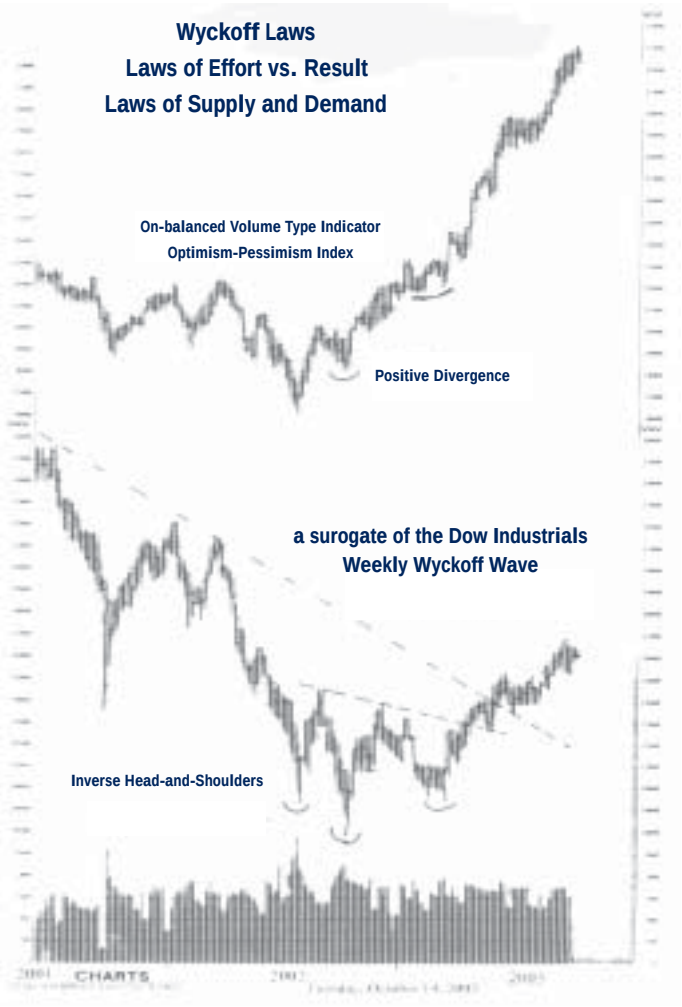
The Wyckoff Method is a school of thought in technical Market analysis that necessitates judgment. Although the Wyckoff Method is not a mechanical system per se, nevertheless high reward/low risk opportunities can be routinely and systematically based on what Wyckoff identified as three fundamental laws (see Table #1):

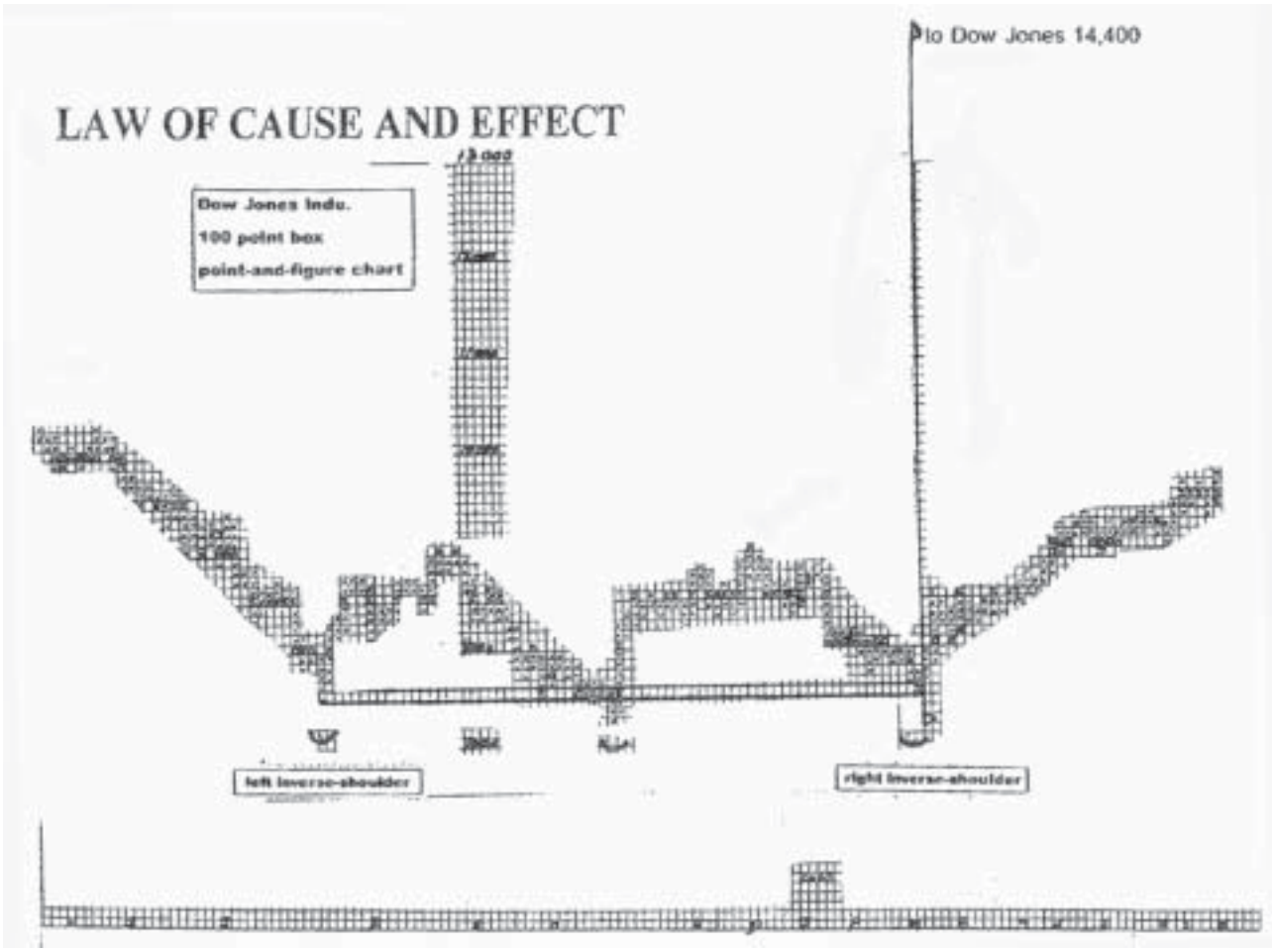
Table 1

1. **The Law of Supply and Demand** – states that when demand is greater than supply, prices will rise; and when supply is greater than demand,prices will fall. Here the analyst studies the relationship between supply vs demand using price and volume over time as found on a barchart.
2. **The Law of Effort vs Result** – Divergencies and disharmonies between volume and price often presage a change in the direction of the price trend. The Wyckoff "Optimism vs Pessimism" Index is an on-balanced-volume type of indicator that is helpful for indentifying accumulation vs distributiion and guaging effort.
3. **The Law of Cause and Effect** – postulates that in order to have an effect you must first have a cause, and that effect will be in proportion to the cause. The law's operation can be seen working as the force of accumulation or distribution builds up within a trading range and works itself out in the subsequent move out of the trading range. Point and Figure chart counts can be used to measure this cause and project the extent of its effect.

PRESENT POSITION OF THE U.S. STOCK MARKET IN 2003: BULLISH

Charts #1 and #2 show the application of the Three Wyckoff Laws to U.S. Stocks during 2002-2003. Chart #1, a bar chart, shows the decline in price during 2001-02, an inverse head-and-shoulders base formed during 2002-2003 and the start of a new bull market during March-June 2003. The upward trend reversal defined by the Law of Supply vs. Demand, exhibited in the lower part of the chart, was presaged by the positive divergencies signaled by the Optimism Pessimism (on-balanced-volume) Index. These expressions of positive divergence in late 2002 and early 2003 showed the Law of Effort (volume) versus Result (price) in action. Those divergences reveal an exhaustion in supply and the rising dominance of demand or accumulation.





The bullish price trend during 2003 was confirmed by the steeply rising OBV index; accumulation during the trading range this continued upward as the price rose in 2003. Together the Laws of Supply and Demand and Effort vs. Result revealed a powerful bull market underway.

FUTURE: A MARKET TEST IN 2004

The authors as academics are intrigued by the natural laboratory conditions of the stock market. A prediction study is the sine quo non of a good laboratory experiment. The Wyckoff Law of Cause and Effect seemed to us to provide an unusually fine instrument of conducting such an experiment, a "forward test." Parenthetically, it has been our feeling, shared by academics in general, that technicians have focused too heavily upon "backtesting" and not sufficiently upon real experimentation. The time series and metric nature of the market data allow for "forward testing." Forward testing necessitates prediction, then followed by the empirical test of the prediction with market data that tell what actually happened.

How far will this bull market rise? Wyckoff used the Law of Cause and Effect and the Point-and-figure chart to answer the question of "how far." Using the Inverse Head-and-Shoulders formation as the base of accumulation from which to take a measurement, of the "cause" built during the accumulation phase, the point-and-figure chart (Chart #2) indicates 72 boxes between the right inverse-shoulder and the left inverse-shoulder. Each box has a value of 100 Dow points. Hence, the point-and-figure chart reveals a base of accumulation for a potential rise of 7,200 points. When added to the low of 7,200 the price projects upward to 14,400. Hence, the expectation is for the Dow Industrials to continue to rise to 14,400 before the onset of distribution and the commencement of the next bear market. If the Dow during 2004-2005 comes within + or - 10% of the projected 7,200 points we will accept the prediction as having been positive.

CONCLUSIONS

In summary, U.S. equities are in a bull market with a potential to rise to Dow Jones 14,400. The anticipation is for the continuance of this powerful bull market in the Dow Industrial Average of the U.S.A. through 2004. This market forecast is the "test" to which the Wyckoff Method of Technical Analysis is being subjected.

Part (B) of "Wyckoff Laws: A Market Test" will be a report in year 2005 about "What Actually Happened." As with classical laboratory experiments, the results will be recorded, interpreted and appraised. This sequel will invite a critical appraisal of the Wyckoff Laws and in particular a critical appraisal of the Wyckoff Law of Effort vs. Result. The quality of the author's application of the Wyckoff Laws will also undergo a critique. From these investigations and appraisals, we shall strive to extract lessons for the improvement of technical market analyses. Irrespective of the outcomes of this market test, we are confident that the appreciation of the Wyckoff Method of Technical Market Analysis will advance and that the stature of Mr. Richard D. Wyckoff will not diminish.

REFERENCES

- Forte, Jim, CMT, "Anatomy of a Trading Range," Market Technicians Association Journal," Summer-Fall 1994.
- Lefervé, Edwin, Reminiscences Of A Stock Operator, Wiley Press (original, Doran & Co, 1923).
- Penn, David, "The Titans of Technical Analysis," *Technical Analysis Of Stock & Commodities*, October 2002.
- Pruden, Henry (Hank) O., "Wyckoff Tests: Nine Classic Tests For Accumulation; Nine New Tests for Re-accumulation," Market Technicians Association Journal, Spring-Summer 2001.

- Pruden, Henry, 'A Test of Wyckoff', *The Technical Analyst*, February 2004.
- Charts, courtesy of Wyckoff/Stock Market Institute, 13601 N. 19th Avenue #1, Phoenix, Arizona, U.S.A. 85029-1672.

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Twelve Chart Patterns Within A Cobweb[1]

Claude Mattern, DipITA

"The (stock) market goes right on repeating the same old movements in much the same old routine" –Robert D. Edwards

INTRODUCTION

One of the most common and useful tools in technical analysis is a price pattern at the top or bottom of a trend or during a consolidation period. Twelve major chart formations may be observed in the market.

Tradition has led to a well-accepted classification among technical analysts. However, you will see in this article that the distribution of chart formations between these categories is not so clear. John Murphy (1986; p.136) wrote, "The trick is to distinguish between the two types of patterns as early as possible during the formation of the pattern." Martin Pring (1985; p.44) wrote, "During the period of formation, there is no way of knowing in advance which way the price will ultimately break." The main purpose of this article is to analyse those propositions and to provide a new classification.

After a review of the 'state of the art', I will characterise the behaviour of the market "behind the curve" to find out its structure. We will then see that the dynamic process of exchange has a dimension in time that will lead to certain behaviours of the price. Two main behaviours may be observed:

1. Price will either oscillate around an equilibrium price, during formation, or
2. Its move will be induced by a shift of the equilibrium price, during the exit phase of the period.

A new classification of the chart pattern will then be proposed. This article will end with some thoughts about how to use those patterns, in light of the properties of this new classification.

Table 1

Name	Pattern	Qualification by	Summary	Duration	Number of oscillations
	Stylised fact	Schabacker Edward & Magee Murphy Pring			
Triangle		Reversal (3)/ Continuation(13) Reversal (3) - (4) Continuation (6) reversal/consolidation	indeterminate	major	3+
Broadening Formation		Reversal (8)/ Continuation Reversal (8) Reversal / Continuation (7) reversal	indeterminate	major	3+
Diamond		Reversal (10) Reversal (9) Continuation (8)	indeterminate	minor	3+
Wedge		Reversal (4) Reversal (10) Continuation (11) continuation	indeterminate	major/ minor	3+
Rectangle		Reversal (11)/ Continuation (15) Reversal Reversal continuation	indeterminate	minor	3+

Chart patterns

I suspect that pattern recognition has been accumulated right from the start since traders have been following price movements on charts. Recurrent patterns were quickly recognised. I shall review the "academic" classification of the chart patterns, which shows that there is not a wide consensus.

Classification

As pointed out by Murphy, there are two types of patterns:

1. Reversal Patterns – where the price move has changed the trend (according to the definition of a trend) and
2. Continuation Patterns – where there are suggestions that the price is pausing, and maintaining its previous trend.

A Reversal Pattern needs, according to Murphy, a prior trend, a break of an important trend line, a large base or large volume on the break.

A Continuation Pattern is a "pause in the prevailing trend" (Murphy; p.136). Pring suggested that, as it is difficult to know in advance how price will exit, "the prevailing trend is in existence until it is proved to have been reversed." Schabaker (1932; p.179) took an opposite view, which ends to be the same: " the most logical explanation of continuation formation goes back to a basic possibility that it might turn out to be a reversal."

Among the twelve patterns[2], there is a clear consensus on the classification of five patterns as Reversal formations (Double; Triple; Head-and-Shoulders; Rounding and Spike) and on two patterns as Continuation formations (Flag and Pennant). But contradictions appear on five patterns.

PATTERNS REVIEW

The Triangles:

This was the third most important reversal formation for Schabacker (p.74), which was partly supported by Pring, quoting it as the most common pattern.

But Schabacker, while analysing Triangles as a Reversal Pattern quickly wrote, "Triangle is by no means always indicative of a reversal in technical position" (p.75). The main problem, also highlighted by Edwards and Magee, is that "...there is no sure way of telling during its formation whether a Triangle will be intermediate or a reversal." That is why Pring added that, unfortunately, this is also the least reliable pattern (p.63).

Schabacker recognised that it "denotes continuation more often than reversal..." Edwards and Magee estimated that in three cases of four, triangles are continuation patterns, even if they include it in an "Important Reversal Patterns" chapter (p.106). Hence, Murphy included the Triangle in the Continuation Pattern, but he also points out that the Ascending Triangle may appear as a bottom, while the Descending Triangle is seen as a top.

Pring, finally, stated that "triangles may be consolidation or reversal formations," which actually stops controversy.

Triangles are one of the most important patterns used in chart analysis. But, unfortunately, it is hard to qualify it as continuation or reversal. A frequency analysis of the exit would give some probabilities. But, within its formation, there are no clues for forecasting the issue.

This contradiction also appears for the patterns of roughly the same shape: i.e. Broadening Formations or Rectangles.

The Diamond

Edwards and Magee signalled that the Diamond pattern was a reversal pattern that may look like a Head-and-Shoulders with a V neckline. John Murphy wrote about Diamonds in the Continuation Patterns chapter. But later on, he wrote that this pattern was "often seen at market tops." A diamond was also defined as an incomplete Broadening Formation, followed by a Symmetrical Triangle. As the qualification of those two patterns was undetermined, the Diamond is, by association, undetermined.

The Wedge

This is another confusing pattern, whether it appears in a correction phase or at the end of a trend. For Schabacker, an Ascending Wedge was a bearish reversal pattern (falling wedge is bullish), as this pattern appears at the end of a bullish trend. Edwards and Magee wrote about a Rising Wedge. Ralph N Elliott also noticed this configuration. But Schabacker wrote that a Wedge was a Reversal Pattern "because it forecasts a reversal of the trend ... but it is not so easy to explain why it should act the way it does." The puzzle in that classification came from Murphy who indicated that a "falling wedge is considered bullish and a rising wedge is bearish" when they move against the trend, as a continuation pattern, but they "can appear at tops or bottoms," which is "much less common." Pring also supported this consolidation classification.

Under the name of a wedge, we do have an opposite view.

DISCUSSION

The distinction between Reversal Patterns and Continuation Patterns is finally of no use, as the classification of nearly half of the patterns are indeterminate, while the purpose of a classification should actually avoid such a problem. I notice, however, that there is unanimity on one point: the exit will tell, in the end, the whole story. We have to rely on that fact, and only on it.

Proposition 1: Only the exit will qualify the pattern and will forecast the direction of the next trend

If classification cannot be found from observation of the price patterns, then we examine if the review of the definition of the patterns may highlight their structure. To do so, I have defined the pattern, according to the different authors, with a common language. The Table 2 summarises this survey.

Table 2

Double-Top	Two peaks, with the second slightly lower than the first. The break of the baseline, determined by the intermediate trough, will validate the pattern.
Head-and-Shoulders	Three peaks, with the middle one higher than the first and the third. The break of the line joining the two intermediate troughs will validate the pattern.
Triple-Top	Three peaks at roughly the same level. The break of the line joining the two intermediate troughs will validate the pattern.
Rounding tops	A gradual and slow motion that is contained by a curve.
Spike	One peak, signalling an abrupt reversal
Triangle	A series of price oscillations, with the range narrowing. The down-slant resistance line and the up-slant support line are converging towards the apex.
Broadening	A series of price oscillations, with the range enlarging. The down-slant support line and the up-slant resistance line are diverging from the apex.
Diamond	A series of price oscillations contained within an "inverted triangle" at first followed by a "symmetrical triangle".
Wedge:	A series of price oscillations, with the range narrowing. The resistance and the support lines, that are converging towards the apex, are oriented in the same direction
Rectangle	A series of price oscillations, within a stable range. The border lines are horizontal.
Pennant	A series of small oscillations between two converging border lines
Flag	A series of small oscillations between two upward or downward parallel lines.

From those definitions, two categories of patterns emerge:

1. Those that are defined by their peaks (or troughs) and a line break and
2. Those that are featured by a range and two border lines.

There is definitely an opposition between those two definitions.

But this opposition is only apparent, as patterns defined like a series of oscillations, suggesting a sideways pattern, do not argue in favour of a continuation configuration. The definition is mainly linked to the formation of the pattern, but it does not imply the direction of the issue.

We might conjecture, at this stage, that the basis of a chart pattern is a series of oscillations, while a pattern defined by its peaks only suggest that it is incomplete (a double-top might be a failed triangle).

Proposition 2: a chart pattern is a series of oscillations.

I shall now prove those two propositions that will be a "theorem":

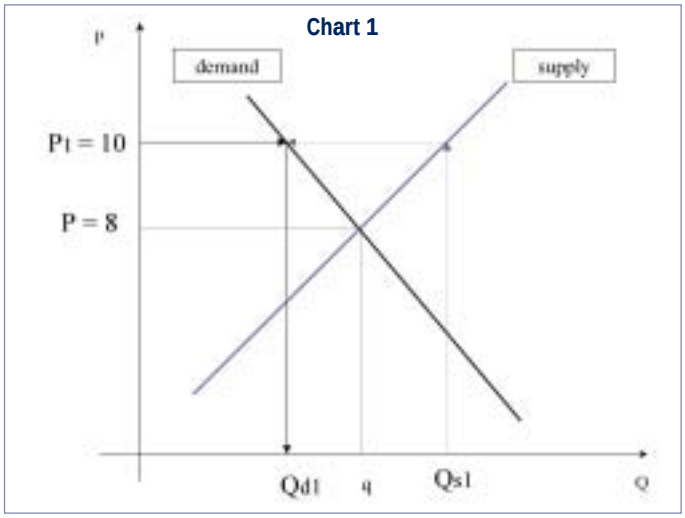
Theorem: only the exit of a chart pattern, that is define by a series of oscillations, will inform about the direction of the market

To demonstrate this theorem, I shall analyse the formation of a pattern, in terms of demand and supply. I shall at first present the concepts of demand and supply, which have been well documented by economists. This would allow us to present a stylised dynamic process of price.

DEMAND AND SUPPLY

The law of demand and supply states that after a transaction, all buyers who wished to buy at a certain price or above have met sellers who intended to sell at this price or below. However, the most important fact is that buyers who wished to buy at a lower price and sellers, who wished to sell at a higher price, remain in the market. The new information – price and volume – will modify their plans, which were apparently wrong in their quotation. The new price, revealed to the market, will also induce new buyers and new sellers.

Chart 1



The slope of the demand (volume of the demand for price at or above a certain level) is negative, as the demand will increase when the price is lower. The angle of the slope depends on the behaviour of the traders who wish to buy. The slope can be high, approaching the vertical. That means that a slight variation of volume will imply a big change in the price. This is a very risky market, with high volatility, due to a light market.

A nearly flat demand curve, on the other hand, means that only a large order would move the price a little. The price is rather inelastic to the demand. The risk is low.

The supply curve is just the opposite, the slope being positive. Note that on very specific occasions, the demand (the supply) might have a positive slope (negative): this means that there are more buyers when the price increases (i.e. due to stop loss orders or gamma negative manage-

ment). This is exceptional and does not hold for a long time, but could be devastating (like the USDJPY currency fall in October '98).

Now we have a stable situation, where, at the equilibrium, the exchange price allows transaction between traders, at a price that equals demand to supply. As they have no information about what the others are doing, the new price and the volume is new information for all of them. This is internal information for the traders. They will also revise their plan according to external information that may change their expectation.

New transaction price and new information will shift the demand and supply curves, inducing a trend movement. Those curves are however very unstable in the short term, while rather stable in the long term.

Now, if the market price is lower than the equilibrium one[3], there will be a surplus on the demand side (the demand will be higher than the supply). Exchange is impossible in that case. It will lead to a dynamic process towards the equilibrium price.

DYNAMIC AND CYCLE

How do the dynamics work? We assume that the buyer makes his choice according to the price seen yesterday. The seller, however, take his decision according to the price seen today. This assumption could be different (opposite or more complicated). That will not change the model, but only the dynamic and the interpretation.

The chart below reflects the dynamic process, which looks like a cobweb[4], as the price oscillates around the equilibrium price. From a low market price, the buying pressure is stronger than the selling (i.e. demand is above supply). The market has found a good support. Price is rebounding, until it met supply, that is enough to wash all the demand. But at this new higher price, demand has vanished, leaving the market under the paw of the sellers. The market price fell, until it met new buying pressure.

Such adjustment takes time. If we assume that it takes one period for each price move, then, by cancelling the volume axis, and replacing it with time, we notice that the price move is an oscillation that reflects a pattern. I will review if such a model can explain chart patterns, by modifying the slope of the curves of demand and supply or shifting those curves.

Chart 2

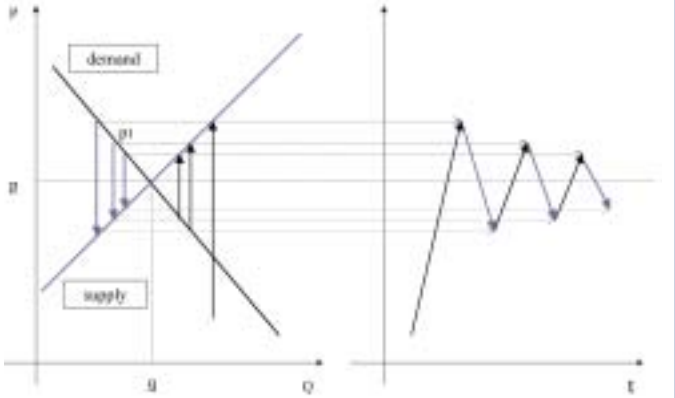


Chart 2: this translates the dynamic process implied by the cobweb theory into the price oscillation. Assuming that the cobweb theory correctly explains the way the market works, then we see price evolving around a fixed level. But that does not mean if we see such a move in the real world that it proves that the market behaves like the cobweb theory says.

From that study, we conclude that two complementary effects influence the price move:

1. A market adjustment where the price oscillates around the equilibrium level. In that configuration the demand and supply curves are not shifting. This is mainly position adjustment, called distribution or accumulation periods by technical analysts.
2. A change of the equilibrium level, due to a shift of the demand and/or supply curves. In that configuration, the external conditions, mainly fundamentals, have modified the beliefs and the opinions of the traders.

When analysing the price motion, technical analysts must bear in mind the two processes:

1. An adjustment process that reflects an oscillation around an equilibrium price, but does not include the direction of the next move
2. A change of the equilibrium level, which explains a major breakout.

Such a dynamic in the market (i.e. oscillations or cycle) is widely justified by two factors. First, the product traded is not directly consumed, but is stocked. Secondly, the decisions of the buyers or the sellers are taken on the basis of the expected prices rather than the current price, and thus are subject to mistakes.

FOR A NEW CLASSIFICATION

We have seen that there are two types of patterns: those that are defined by their peaks (and troughs) and a line break and those that are featured by a range and two border lines, which roughly characterise the reversal patterns and the sideways patterns. We have seen that according to the cobweb theory, there are also mainly two types of price behaviour according to the supply and demand curves. The market may be engaged into an adjustment process. It may also have been on a process of a shift of the equilibrium price.

I will then define a pattern as an adjustment around an equilibrium price with, in some particular cases a slight shift in demand or supply. The absolute rule states that demand and supply curves are stable. The price is only oscillating around the equilibrium price.

An exit of the pattern will imply, on the other hand, a major shift in demand and/or supply that will move the equilibrium price away from the prevailing one, leading to a breakout of the former behaviour.

So, the first major feature of a price pattern is the number of peaks/troughs, before a modification of the equilibrium price.

The benchmarks of price adjustment around an equilibrium price are Triangles (symmetrical or inverted), Rectangles and Broadening Formations. Some variations of those three canonical patterns would directly induce the Wedge; the Diamond; the Flag and the Pennant.

Those patterns are assumed to last until the demand and the supply curves shift the equilibrium price away.

The Spike, the Double-Top, the Triple-Top and the Head and Shoulders are patterns that are truncated Triangles or Rectangles, due to an earlier change of the equilibrium price. So, I suggest the classification below, based on oscillations.

One-oscillation pattern	Spike
Two-oscillation pattern	Double-bottom and Double-top
Three-oscillation pattern	Head and Shoulders; Triple Top and Triple Bottom
Four-oscillation pattern	Triangle; Broadening; Diamond; Rectangle; Wedge; Pennant; Flag
Non-clear oscillation pattern	Rounded Bottom and Rounded Top

I will review some of those patterns, within the new light of the dynamic process implied by the demand and supply curves. We will see that the classification by the number of oscillations is a "natural" one.

Triangles

Definition: A series of price oscillations, with the range narrowing. The down-slant border line and the up-slant border line are converging towards the apex. The base is the vertical at the first peak.

Chart 3: USDJPY has oscillated around 145.00 during eight months, before rising towards the target of the triangle, at 160.00.

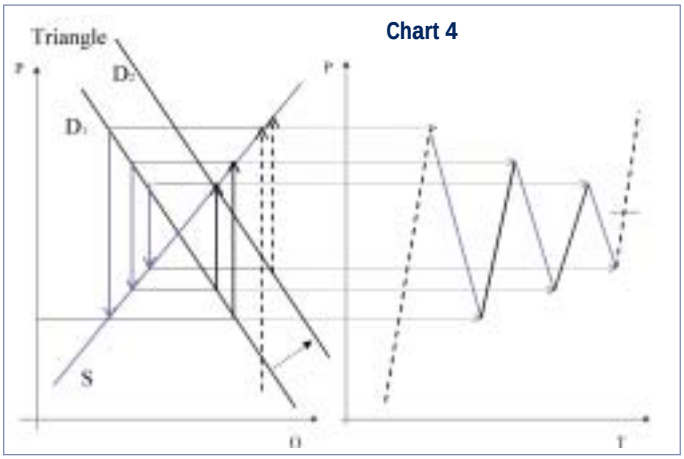


Chart 4: this is one of the three canonical pattern, where the curves do not shift until the exit. The price oscillation is converging towards the equilibrium price, due to the lower slope of the supply, relative to the slope of the demand (in absolute value). This is the opposite of the inverted triangle.

Broadening Triangles

Definition: A series of price oscillations, with the range enlarging. The down-slant border line and the up-slant border line are diverging from the apex. The base is the vertical at the last peak, before the breakout.

Chart 5: The Dow Jones Industrial Average formed a Broadening Formation in 1996 (such has not been found on the currency pairs on a daily basis). Such a configuration qualifies as rare by most observers.

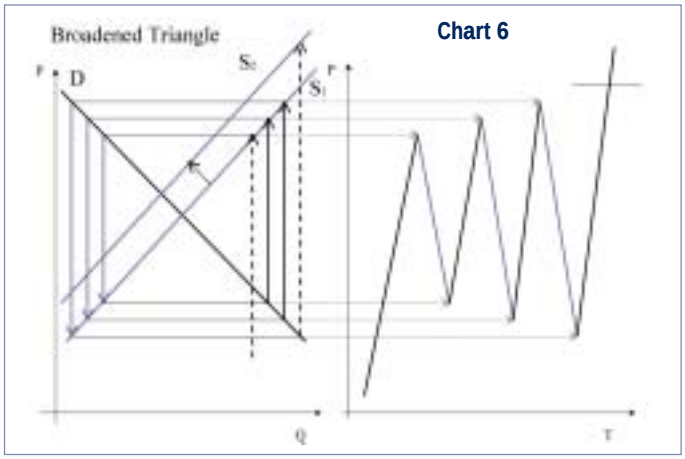


Chart 6: this is the first canonical pattern, in the sense that the demand and the supply curves do not change during the oscillations. The exit however, like all the other patterns, needs a shift. The Broadening Formation is a diverging oscillation of the price from the equilibrium price. The relative slopes of the demand and supply curves imply this move. The slope of the supply is higher than the slope of demand, in absolute value terms.

Double-Tops

Definition: a double top (bottom) consists of two peaks (troughs) around a valley (reaction).

Chart 7: USD/CHF has completed a double top during April/June 1989, with the exit in June 23rd, '89. After a rebound above the baseline during three days, the currency pair has validated a double top, reaching the target within the next four days.

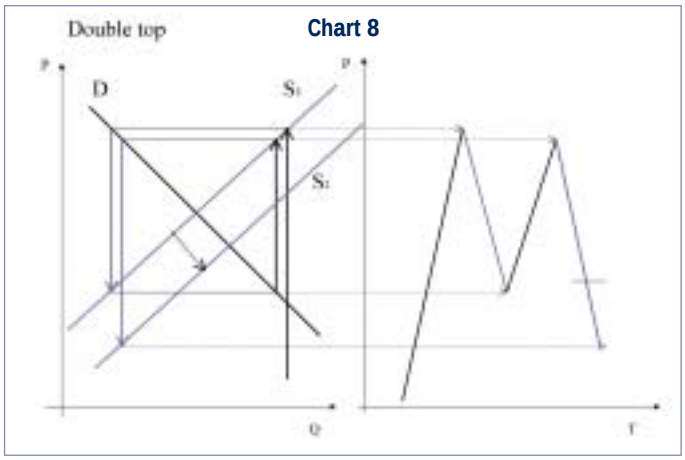


Chart 8 : The stylised double-top is reflected by two oscillations before a shift of the supply (in that case), which has increased (the curve have shifted on the right, meaning that for a same level of price, the volume prepared to be sold is much higher). As the double top is only validated with the break of the previous trough, we note that this can only be done by a rise of the supply (or a fall of the demand).

The analysis of the chart pattern has revealed that until the build-up of the formation is complete, it is impossible to anticipate the direction of the market that shall be revealed by a shift of demand and /or supply that has not happened yet.. It is thus clear that within the pattern, it is highly speculative to forecast the type of pattern that will appear, but it has nothing to do with technical analysis. We have seen that after three reversals, the configuration remains open, even if the market has already done a lot of "consolidation distance." We have also seen that the exit is the most important information of a chart pattern, as it will tell us:

1. Whether the formation or the oscillations have finished and
2. The direction of the next move.

The exit is the result of a major shift of the demand and the supply curves. Traders must intervene in the market with that idea in mind. We will see in the next part the implication for trading and anticipating.

TRADING AND ANTICIPATION

The progressive development of a price pattern requires an adaptive strategy for the trader or the advisor. This strategy could be named the BET process, which implies a three-step progression with a strict order:

The Build-up period (**B**); The Exit of the pattern (**E**); The Target (**T**).

Each phase must be complete, before managing the following step. That means that it is impossible to project a target during the building of the pattern.

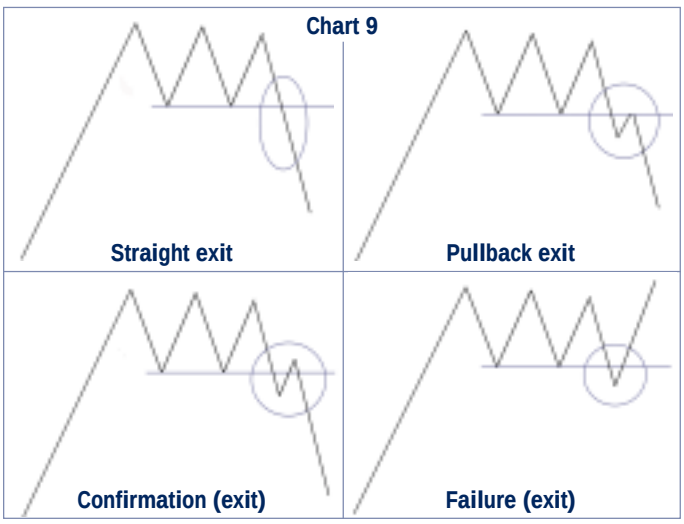
Build-up phase:

During this phase, no long-term positions should be committed, but previous positions should be kept.

Otherwise, range trading can be implemented, according to different scenarios. The trader would anticipate the next move according to the current one with the chart patterns in prospective. The trader or the advisor might use other technical tools (trend lines, retracements, waves counts, etc.), except "potential" chart pattern.

Exit

The exit of a pattern requires a shift of the demand and/or the supply curves, which reflects a fundamental change of the opinion of the operators. This phase of the pattern is the most important one, as this is when one's position is managed. Four different exits can be surveyed:



Those exits are closely related to the way the market is trading a change of trend – either a reversal or a resumption of the previous trend, after a consolidation. Position adjustments are thus adding pressure to the fundamental shift of the demand and the supply.

Target

Some patterns have explicit targets, after the exit. They are only guidelines. From the Cobweb theory, the shift of the demand and supply curves that has broken the previous adjustment pattern does not depend, at first sight, on the length and the height of the pattern. But, in an after thought, the trend that happens after the exit of a pattern does imply position adjustments that were opened during the previous period. So, each move in the market does depend, in a certain way, on the motions seen in the past[5]. If the price exits from a triangle on the downside, it implies that, at a certain time or at a certain price level, buying pressure will appear, induced by the short position opened during the build-up of the triangle. On the opposite side, selling pressure will appear after the downside break, on closing long positions, stopping the losses. So the amount of new open interest built during the pattern will induce the extension of the downside. But this influence is only partial. Other beliefs might also influence the strength of the downward trend, rather than the strict technical point of view. That is probably why the target of a pattern should only be qualified as potential.

The behaviour of the price after an exit of a pattern will largely depend on the type of product that is traded (equities, bonds, commodities or currency pairs). This can only be set by an ad hoc study of the pattern, according to the market.

CONCLUSION

In this article, I have put forward simple criteria with the number of peaks/troughs, to separate the different patterns that are sufficiently strong to hold in whatever environment. But then, the pattern, during its build-up cannot tell us where the price will go later. The technical analyst and/or the trader must wait for the exit of the pattern, as it is only from that event that we have the information that the behaviour of the price has changed. During the build-up of the pattern, we have no information about this change. We can only trade within the pattern, but not beyond, as only the market will tell how it will exit.

This article opens a door to analyse price behaviour as a reflection of the conflict of interest between rational traders with heterogeneous time frames, which leads to a dynamic process where a trend for a certain class of trader may be interpreted as a correction or an adjustment for another class.

This can then be expended to a multiple-cycle pattern, where chart patterns are only a specific area. Additional studies should be done for each pattern, analysing the different features and their varieties. Those analyses should be supported by observation of those patterns on different products, to measure their reliability and their behaviour within the Build-up-Exit-Target paradigm. A first set of studies could be the analysis of a pattern with different types of financial products, to measure their reliabilities. Another study could be an investigation of how a certain financial product behaves according to those patterns (e.g. EUR/GBP currency develops more triangles than double-tops or bottoms; EUR/JPY currency draws more wedges or Rounding formations; EUR/USD currency has more double-tops or bottoms). Chart patterns have been in the toolbox of technical analysts for a long time but there is still a lot to say and to study in the future.

We also leave on the table the BET system, which appears here only as a consequence of the Pattern/Cobweb theory. A trading system built on this paradigm still has to be written. The main purpose of this system is, however, to give some rules to the trader or the analyst, showing the risk taken by them when they buy or sell the pattern before the end of its formation.

REFERENCES

Books

- Edwards, Robert D. and Magee, John, 1992, Technical Analysis of Stock Trends, New York Institute of Finance
- Henderson, J.M. and Quandt, R.E. 1971, Microeconomic Theory, McGraw-Hill Book Company
- Murphy, John J. 1986 Technical Analysis of the Futures Markets, New York Institute of Finance
- Pring, Martin J., 1985, Technical Analysis Explained, McGraw-Hill Book Company
- Samuelson, Paul A., 1947, Foundations of Economic Analysis, Harvard University Press
- Schabacker, Richard W., 1932, Technical Analysis and Stock Market Profits

Articles

- Ezekiel, Mordecai, 1938, "The Cobweb Theorem," *Quarterly Journal of Economics*, February 1938
- Nerlove, Marc, 1958, "Adaptive Expectations and Cobweb Phenoma," Quarterly Journal of Economics, May 1958, p. 227-240
- Laedermann, Serge, 2000, "Head-and-Shoulders Accuracy and How to Trade Them," *IFTA Journal*, 2000 Edition, p.14-21.
- Lo, Andrew W, Mamaysky, Harry, and Wang, Jiang, 2000, "Foundations of Technical Analysis: Computational Algorithms, Statistical Inference, and Empirical Implementation," *The Journal of Finance*, August 2000, p. 1705-1765.
- Muth, John F., 1961, "Rational Expectations and the Theory of Price Movements," *Econometrica*, July 1961, p. 315-335.
- Osler, C.L., "Identifying Noise Trader: The Head-and-Shoulders Pattern in U.S. Equities." Federal Reserve Bank of New York, February 1998
- Osler, C.L. and Kevin Chang P.H., "Head and Shoulders : Not Just a Flaky Pattern," *Staff Report n°4*, Federal Reserve Bank of New York, August 1995

FOOTNOTES

1 *Part of this analysis has been presented at the IFTA Conference in Dublin in 1992 and in Washington in 2003 by the author. This article is a reduced version (cut half) of a Research Paper done for the DITA III, presented in November 2001 and passed in May 2002.*

2 *Different authors have noticed other patterns, but they remain mostly anecdotal. I deliberately left them out, while I suspect that they might provide good information from time to time. Those patterns are Drooping Bottom; Horn; Half Moon; Scallops or Dormant. Inverted Triangle has been included as the Broadening Formation.*

3 *Three prices can be defined: the market price, where there is real transaction; the expected price, which is the trader anticipated price based on fundamentals (financial analysis) or past prices (quantitative and technical analysis) and the equilibrium price, which is based by the economics (unobservable).*

4 *Mordecai Ezekiel, who did a lot of work for the Department of Agriculture in the US (USDA) during the 1920s and 1930s, built a dynamical model of price adjustment called the cobweb process.*

5 *This proposition is in contradiction with the random walk, that states that price variations are independent. We will not discuss the latter hypothesis. The only observation that we are making is that, as long as a trader opens a position at risk in the market, this position has to be closed in the future. This means that some portion of today's variation of the price will imply tomorrow's variation, if variations of a price do reflect the buying and the selling pressures.*

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